

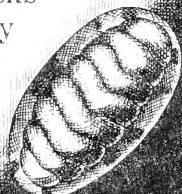
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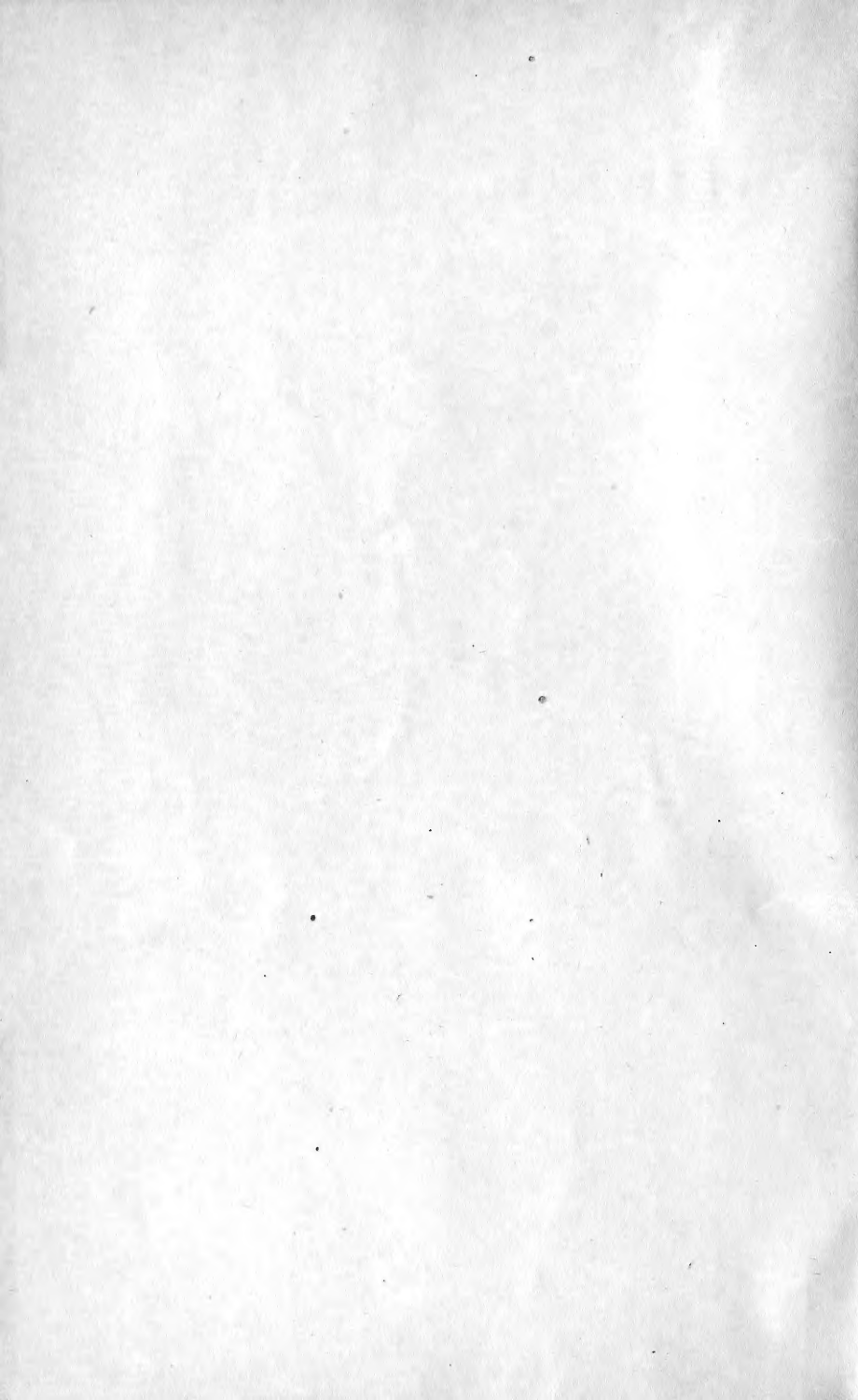
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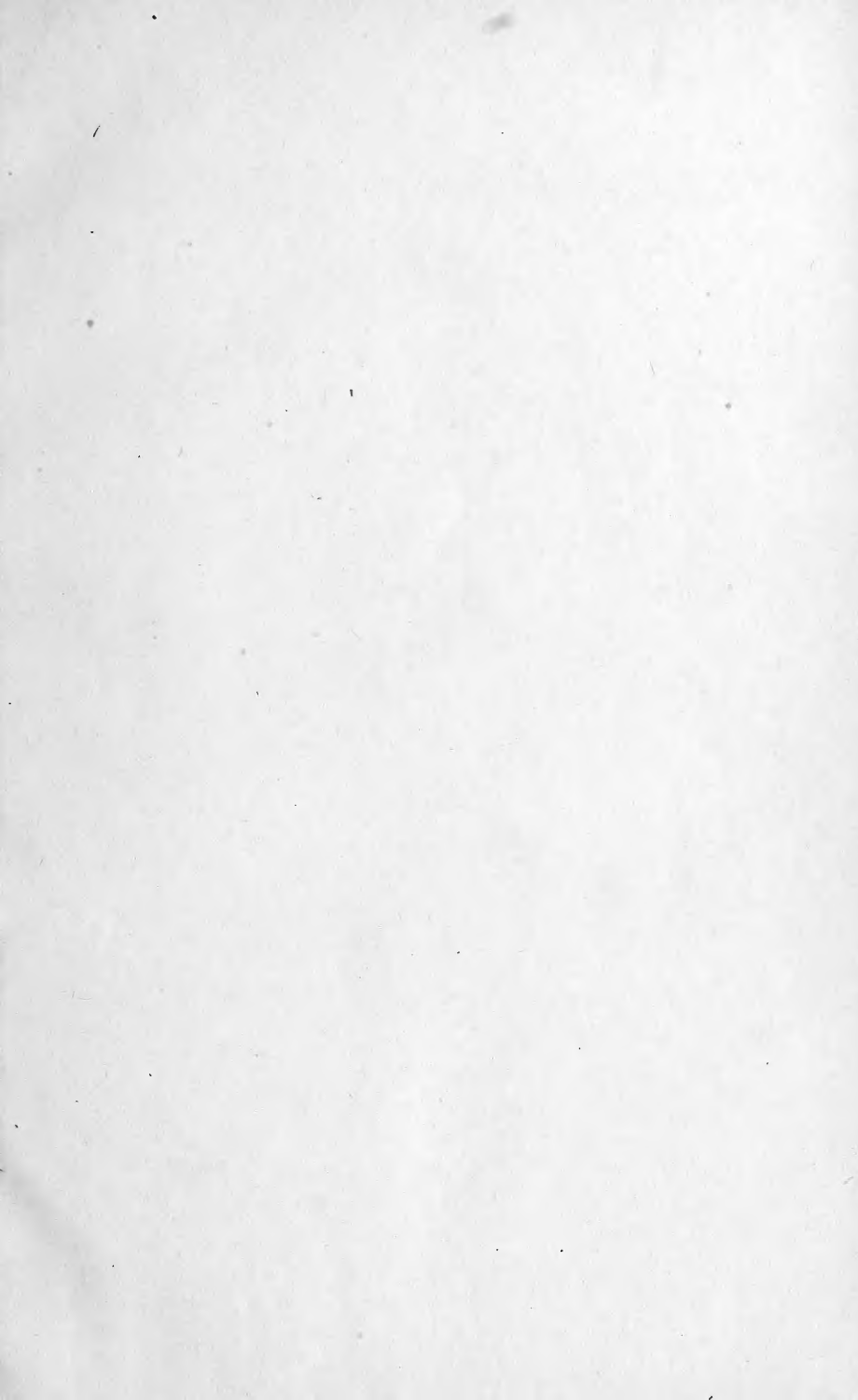
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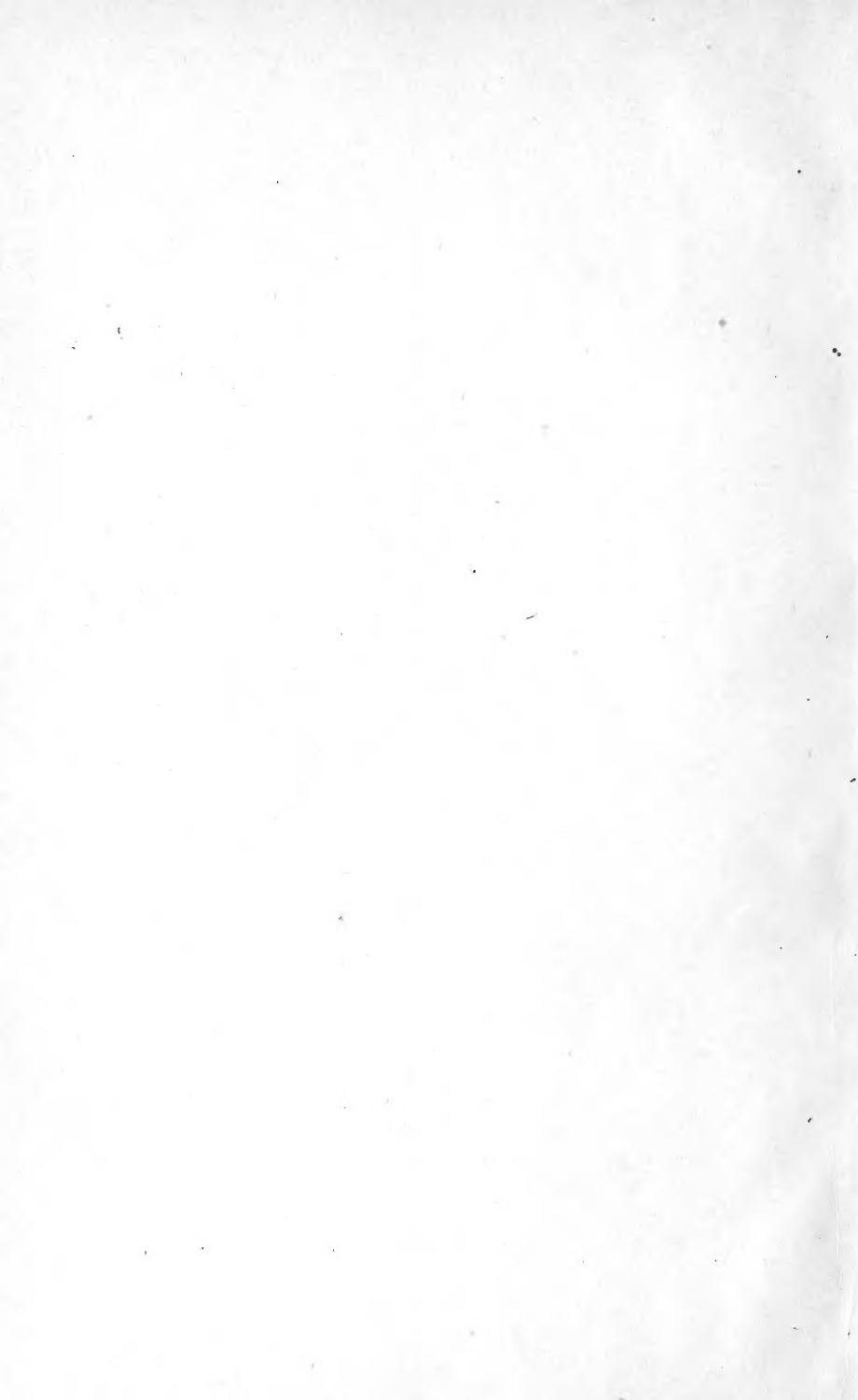
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JOURNAL OF CONCHOLOGY:

BEING THE ORGAN OF THE
CONCHOLOGICAL SOCIETY
OF GREAT BRITAIN AND IRELAND.

EDITED, UNDER THE DIRECTION OF THE COUNCIL,

BY

J. R. LE B. TOMLIN, M.A.

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VOL. XIV.

1913—1915.



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- 1.—This Society shall be called “The Conchological Society of Great Britain and Ireland.”
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 1892. Cooper, James Eddowes, Cadboro, 53, North Road, Highgate, N.
 1890. Crawford, James, c/o J. C. Kemsley and Co., Port Elizabeth, Cape Colony
 1910. Cribb, C. Theodore, The Vicarage, Shipley, Yorks.
 1899. Crowther, J. E., Portland Street, Elland, Yorks.
 1879. Cundall, Jas. W., 3, Orlando Road, Clapham Common, S.W.
1897. Dacie, John Charles, 30, Montserrat Road, Putney, S.W.
 1904. *Dalglish, Gordon, 29, Larkfield Road, Richmond, Surrey.
 1899. Darnbrough, Frederick, 12, West End Terr., Yarm Rd., Stockton-on-Tees
 1897. *L* Dautzenberg, Ph., 213, Rue de l' Université, Paris.
 1909. Dawes, L., Hambledon, Hants.
 1898. Dean, J. Davy, 84, Dale Street, Lancaster.
 1909. Dickson, Robert Cecil, M.B., Ch.B., 31, Castle Street, Dumfries.
 1909. Diver, Cyril, The Birches, Haslemere.
 1907. Dupont, Evenor, Hell-Bourg, Réunion.
 1910. Dyke, F. M., B.Sc. (Lond.), Fairlawn, Spital Road, Bromborough.
1908. Edgar, H. F., 14, Woodside Park Gardens, North Finchley, N.
 1895. Edwards, Thos., 247, Narborough Road, Leicester.
 1901. Edwards, W. H., Hastings Museum, Victoria Institute, Worcester.

1891. Elgar, Hubert, Museum and Public Library, Maidstone.
 1904. *L* Eliot, Sir Chas., K.C.M.G., Endcliffe Holt, Endcliffe Crescent, Sheffield.
 1884. Elliot, Edward J., High Street, Stroud, Gloucestershire.
 1910. Elliott, W. T., D.D.S., F.Z.S., 63, Temple Row, Birmingham.
 1901. *Ensor, A. R., 60, Lumley Road, Skegness.
 1894. Evans, Wm., F.R.S.E., 38, Morningside Park, Edinburgh.

 1897. *L* Farquhar, John, 3, Rose Terrace, African Str., Grahamstown, Cape Colony.
 1891. Farrer, Captain Wm. James, Chapel House, Bassenthwaite, Keswick.
 1897. Fielding, Clement, M.P.S., Clover Hill, Halifax, Yorks.
 1890. Fierke, Frederick Wm., 581, Anlaby Road, Hull.
 1884. *L* Fitzgerald, Rev. H. Purefoy, F.L.S., Lidwells, Goudhurst, Kent.
 1898. Fitzsimons, J. B., M.D., 6, San Remo Terrace, Dawlish.
 1906. Fogerty, Harry, Chamber of Commerce, Limerick.
 1905. Foster, Miss Amy C. S., Hendra, Alum Chine, Bournemouth.
 1912. *L* Frames, P. R., P.O. Box 148, Johannesburg, S. Africa.
 1905. Freeman, William, Hawkhurst, Milton Road, Oundle.
 1906. Freyberg, Cuthbert, 27, Hawker Street, Wellington, New Zealand.
 1892. Fulton, Hugh, River Side, Kew, near London.

 1907. *L* Gabriel, Charles J., 297, Victoria Street, Abbotsford, Victoria, Australia.
 1911. Geiser, Samuel W., Upper Iowa University, Fayette, Iowa, U.S.A.
 1887. Gerland, Conrad, M.Sc., Ph.D., F.C.S., Meadow Bank, Accrington.
 1908. Gill, Mrs. A. E., Dinant Cottage, 1, Claude Road, Chorlton-cum-Hardy.
 1910. Gnosspelius, Miss Hilda T., Silver Holme, Newby Bridge, Ulverston.
 1886. *L* Godlee, Theo., Whips Cross, Walthamstow, Essex.
 1897. *P* Godwin-Austen, H. H., Lt.-Col., F.R.S., etc., Nore, Hascombe, Godalming.
 1906. Gomez, A. da Costa, 201, St. James' Place, Brooklyn, N.Y., U.S.A.
 1902. Gower, Harry D., 55, Benson Road, Croydon.
 1904. Gray, Arthur F., 509, Exchange Buildings, Boston, Mass., U.S.A.
 1905. Green, Wm. A., 4, Salisbury Terrace, Chichester Park, Belfast.
 1904. Grierson, P. H., Kilcarberry House, Clondalkin, Dublin.
 1907. Gripper, F. H., Springfield, Camden Park, Tunbridge Wells.
 1890. Gude, G. K., F.Z.S., 45, West Hill Road, Wandsworth, S.W.
 1886. *P* Gwatkin, Rev. Prof. H. M., D.D., M.A., 8, Scrope Terrace, Cambridge.
 1907. Gwyer, C. D., 303, Putnam Avenue, Brooklyn, N.Y., U.S.A.
 1907. Gynge, Walter, 51, Gladstone Street, Scarborough.

 1909. Haas, Dr. Fritz, Senkenbergisches Museum, Victoria Allee, 7, Frankfurt-am-Main.
 1910. Hadden, Norman G., St. Audrey's, Priory Road, Malvern.
 1895. Hann, Rev. Adam, 1, Park Terrace, Halifax.
 1895. Hardy, John Ray, The Museum, The University, Manchester.
 1887. Hargreaves, J. A., 2, Stepney Road, Scarborough.
 1907. Harrington, Chas. P., Langlands, King's Avenue, Clapham Park, London, S.W.
 1909. Harrison, Richard, 28, Allen Street, Hulme, Manchester.
 1904. Harrison, Russell C., 117, Tooting Bec Rd., Upper Tooting, S.W.
 1889. Hartley, Alfred, 19, Thorpe Garth, Idle, near Bradford, Yorks.
 1887. Harvard, T. Mawson, 4, Queen's Leaze, Forest Hill, S.E.
 1907. Hawkins, H. L., University College, Reading.
 1903. Hawkins, John, J.P., 35, Avenue Road, Grantham.

1887. Heathcote, Wm. Henry, F.L.S., 119a, Fishergate, Preston, Lancs.
 1907. Henderson, J. B., jr., 16th Street and Florida Avenue, Washington, D.C., U.S.A.
 1887. Hey, Thomas, 8, Bloomfield Street, Derby.
 1895. Hibbert, Charles R. C., Riccard's Down, Abbotsham, Bideford, Devon.
 1895.^P Hickson, Prof. Sydney J., D.Sc., M.A., F.R.S., University, Manchester.
 1893. Hill, John, Pike's Villa, Little Eaton, near Derby.
 1886.^L Hillman, Thomas Stanton, Eastgate Street, Lewes, Sussex.
 1907. Hindley, R. T., Langham, Kenley, Surrey.
 1906. Hirase, Y., Karasumaru, Kyoto, Japan.
 1911. Hitchon, Mrs. Susan A., Rhyddington, Oswaldtwistle, Lancs.
 1891.^P Horsley, Rev. Canon J. W., Detling Vicarage, Maidstone.
 1907. Horwood, A. R., Ivanhoe, Gwendolen Road, Leicester.
 1907. Howard, Vernon, Carlton Lodge, Eastgate, Louth.
 1884. Howell, George O., 210, Eglinton Road, Plumstead, Kent.
 1892. Howorth, Sir Henry Hoyle, K.C.I.E., M.P., F.R.S., etc., 30, Collingham Gardens, London, S.W.
 1886.^P Hoyle, W. E., M.A., D.Sc., The National Museum of Wales, Cardiff.
 1895. Hudson, Rev. Hy. A., 445, Stretford Road, Manchester.
 1909. Huggins, Henry C., 17, Clarence Place, Gravesend.
 1911. Humphreys, Griffith, 1, Belsize Avenue, London, N.W.
 1905. Hutton, W. Harrison, 44, Dial Street, Leeds.
 1901. Jackson, J. Wilfrid, F.G.S., The Museum, The University, Manchester.
 1912. Jenkinson, Charles, 1, High Street, Kettering.
 1891. Jenner, James Herbert Augustus, F.E.S., 209, School Hill, Lewes, Sussex.
 1904. Jennings, F. B., 152, Silver Street, Upper Edmonton, N.
 1912.^L Jewell, Miss F., Emsworth, Hants.
 1906. Johnson, Chas. W., Boston Society of Natural History, Boston, Mass., U.S.A.
 1908. *Jolliffe, J. E. A., 93, Dorchester Road, Weymouth.
 1894. Jones, Staff-Surgeon K. H., M.B., Ch.B., F.Z.S., R.N., c/o Admiralty, London, S.W.
 1901. Jukes Browne, A. J., F.R.S., F.G.S., Westleigh, Ash Hill Road, Torquay.
 1907. Kendall, Rev. C. E. Y., S. Mark's Vicarage, Peterborough.
 1897.^L Kennard, A. S., Benenden, Mackenzie Road, Beckenham, Kent.
 1902.^L Kensett, Percy F., Broadmeadow, Coombe Lane, Wimbledon, S.W.
 1897. Kenyon, Mrs. Agnes Fleming, 291, Highett St., Richmond, Melbourne, Victoria.
 1889. Knight, Rev. G. A. Frank, M.A., F.R.S.E., St. Leonard's Bank, Perth.
 1901. Laidlaw, F. F., M.A., Cranston's Ivanhoe Hotel, Bloomsbury St., London, W.C.
 1899. Lancaster, Ernest Le Cronier, B.A., M.B., Winchester House, Swansea.
 1879. Laver, Henry, M.R.C.S., F.L.S., Head Street, Colchester, Essex.
 1894. Lawson, Peter, Jesmond Dene, 87, Finlay St., Fulham, S.W.
 1905. Laycock, John, Sidney, Manitoba, Canada.
 1900. Lebour, Miss M. V., Radcliffe House, Corbridge-on-Tyne, Northumberland.
 1911. Leman, George C., Wynyard, 152, West Hill, Putney, S.W.
 1910. Levett, Rev. T. T., F.Z.S., Frenchgate, Richmond, Yorks.

1899. Lightfoot, Robert M., South African Museum, Cape Town.
 1909. Linton, Mrs., Ye Olde Mill House, Castle Hill, Northallerton.
 1908. Longstaff, Mrs. G. B., Highlands, Putney Heath, S.W.
 1912. Loyd, L. R. W., 17, Sandringham Court, Maida Vale, W.
 1898. Lucas, B. R., Winnington Park, Northwich, Cheshire.
 1910. Lucas, F. R. Tindall, Tewin Vale, Welwyn.
 1891. Lyons, Lady, Kilvrough, Parkmill, R.S.O., Glamorganshire.
1889. MacAndrew, James J., F.L.S., etc., Lukesland, Ivy Bridge, Devonshire.
 1906. Macindoe, Dr. A., D.P.H., Sidmouth, Devon.
 1911. MacLeod, D. J., Hof Ter Meere, 13, Reigerstraat, Ghent, Belgium.
 1884. Madison, James, Turves Green, West Heath Rd., Northfield, Birmingham.
 1911. March, Miss M. C., M.Sc., Healey Grove, Burnley, Lancs.
 1885. Marquand, Ernest D., A.L.S., 46, Kimbolton Road, Bedford.
 1906. Marshall, Arthur G., 66, Victoria Street, Westminster, S.W.
 1887. Marshall, J. T., c/o Editor of *Journal of Conchology*.
 1887.^P Masefield, John R. B., M.A., Rosehill, Cheadle, Staffordshire.
 1904. Massy, Miss A. L., 9, St. James's Terrace, Malahide, Dublin.
 1905. Maxwell, Mrs. Miller, Bangholm Bower, Goldenacre, Edinburgh.
 1889. Mayfield, Arthur, Mendlesham, Stowmarket, Suffolk.
 1903. McClelland, Hugh, Stretton, Balsall Street, Berkswell, Warwickshire.
 1886. McMurtrie, Rev. John, M.A., D.D., 13, Inverleith Place, Edinburgh.
 1880.^P Melvill, James Cosmo, M.A., D.Sc., F.L.S., Meole Brace Hall, Shrewsbury.
 1909. Mercer, Jas. W., 611, Chorley Old Road, Bolton.
 1904. Milne, James N., Foylemore, St. Jude's Avenue, Belfast.
 1907. Milner, Miss Lucinda, Cleveland, Ellesmere Park, Eccles, Manchester.
 1909. Milton, J. W., Harrison House, Crosby.
 1906. Monterosato, Il Marchese di, 2, Via Gregorio Ugdaena, Palermo, Sicily.
 1910. Moorcock, J., 91, Broadfield Road, Catford, S.E.
 1902.^L Moore, Chas. H., 103, Mottram Road, Stalybridge.
 1908. Moore, Albert J., 9, Brook Street, Hull.
 1907. Morey, Frank, F.L.S., Wolverton, Carisbrooke Rd., Newport, Isle of Wight.
 1891. Moss, William, F.C.A., 13, Milton Place, Ashton-under-Lyne.
 1912. Murdoch, G. H., 49, Parliament Hill, Hampstead, N.W.
 1906. Murdoch, R., Wanganui, New Zealand.
 1907. Musham, J. F., F.E.S., Haylands, Brook Street, Selby, Yorks.
1905. Napier, H. C., 15, The Common, Woolwich.
 1911. Nash, Rev. E. H., M.A., Wetley Rocks Vicarage, Stoke-on-Trent.
 1903. Nash, P. B., Bruce Mines, Algona, Ont., Canada.
 1887. Newstead, A. H. L., B.A., 38, Green Street, Bethnal Green, E.
 1891. Newton, Richard Bullen, F.G.S., 11, Twyford Crescent, Acton Hill, London, W.
- 1891.^P Norman, Rev. Canon Alfred Merle, D.C.L., F.R.S., etc., The Red House, Berkhamsted.
 1901. Norton, Miss E. M., 20, Eastfield Road, Westbury-on-Trym, near Bristol.
1887. Oldham, Charles, Kelvin, Boxwell Road, Berkhamsted.
 1910. Oliver, A. M., West Jesmond Villa, Newcastle-on-Tyne.
 1899. Orr, Hugh Lamont, 29, Garfield Street, Belfast.
 1896. Overton, Harry, The Newlands, Boswell Road, Sutton Coldfield.
 1905.^L Owston, Alan, Yokohama, Japan.

1903. Pace, S., Milneholme, Hounslow.
 1900. Pannell, Chas., 13, East Street, Haslemere, Surrey.
 1904. Parritt, H. W., 8, Whitehall Park, Upper Holloway, N.
 1902. Pattison, Ernest, 52, Saxe Coburg Street, Leicester.
 1886. Pearce, Rev. S. Spencer, M.A., Long Combe Vicarage, near Woodstock, Oxfordshire.
 1901. Penrose, G., Royal Institution of Cornwall, Truro.
 1907. Petty, S. L., Dykelands, Ulverston, Lancs.
 1908. Phillips, R. A., Ashburton, Cork.
 1906. Plant, James R., M.R.C.S., L.R.C.P., 107, Hinckley Road, Leicester
 1904. Platt, Thos. H., Harpurhey Mill, Rochdale Road, Manchester.
 1886. Ponsonby, John H., F.Z.S., 15, Chesham Place, London, S.W.
 1905. Poole, W. G., South Lawn, Godalming.
 1903. Preston, Henry, F.G.S., Hawthornden Villa, Spittlegate, Grantham.
 1897. Preston, Hugh Berthon, F.Z.S., 53, West Cromwell Road, London, S.W.
 1907. Priske, R. A. R., 9, Melbourne Avenue, West Ealing, Middlesex.
 1906. *L* Pritchard, G. B., F.G.S., 38, Mantell Street, Moonee Ponds, Victoria.
1906. *L* Radley, Percy E., F.R.M.S., 30, Foxgrove Road, Beckenham, Kent.
 1896. Ragdale, John Rowland, The Beeches, Whitefield, near Manchester.
 1899. Ramanan, Vedaraniyam Venkata, M.A., F.Z.S., 12, Sami Pillai Street, Triplicane, Madras, S. India.
 1906. Reynell, Alexander, Caerleon, Whyteleafe Road, Caterham.
 1905. Reynolds, Laurence R., 233, Aspinwall Avenue, Brookline, Mass., U.S.A.
 1905. Reynolds, W. G., 15, Alfoxton Avenue, West Green, London, N.
 1900. Richards, C. P., Mission House, Stenalees, St. Austell, Cornwall.
 1906. Ritchie, John, jr., Box 2795, Boston, Mass., U.S.A.
 1898. Roberts, A. William Rymer, The Common, Windermere.
 O *P* Roebuck, Wm. Denison, F.L.S., 259, Hyde Park Road, Leeds.
 1907. Rolle, Hermann, Königgrätzer Str. 89, Berlin, S.W.
 1901. Rooth, J. A., M.R.C.S., 6, Richmond Terrace, Brighton.
 1905. Rope, Geo. T., Blaxhall, Tunstall, Suffolk.
 1893. Roseburgh, John, Market Square, Galashiels, Roxburgh.
 1892. Rosevear, John Burman, 109, New King's Rd., Fulham, S.W.
 1910. *L* Rowe, A. W., M.S., M.B., M.A.C.S., F.G.S., Shottendane, Margate.
1910. Saggi, M. K., M.R.A.S., etc., Common Room, Lincoln's Inn, W.C.
 1906. Salisbury, Albert E., Bradgate Villa, 102, Park Road, Loughborough.
 1877. *P* Scharff, Robert F., Ph.D., M.R.I.A., Tudor House, Dundrum, Dublin.
 1906. Schepman, M. M., Bosch en Duin, Huister Heide, Utrecht, Holland.
 1895. *L* Schill, C. H., Crosten Towers, Alderley Edge.
 1886. Scott, Thomas, LL.D., F.L.S., 280, Victoria Road, Torry, Aberdeen.
 1893. Shackleford, Rev. Lewis John, 66, Granville Road, Blackpool.
 1907. Shaer, Isidore, B.A., 12, Seymour Road, Crumpsall, Manchester.
 1906. Sharp, C. J., M.R.C.S., 2, Wellington Avenue, Liverpool.
 1910. *L* Shaw, H. O. N., F.Z.S., Skreens Park, Roxwell, near Chelmsford.
 1904. Shaw, Rev. W. A., Peper Harow Rectory, Godalming.
 1906. Sheppard, T., F.G.S., Municipal Museum, Hull.
 1906. Shopland, Commander E. R., 1, Estivals, Oulton Broad.
 1910. Shrubsole, George, Ellesmere, Fields Park Road, Newport, Mon.
 1895. Sich, Alfred, F.E.S., Corney House, Chiswick, W.
 1906. Sikes, F. H., M.A., F.L.S., Burnham Abbey, Bucks.

1905. Simpson, James, c/o G. Sim, Esq., A.L.S., 52, Castle Street, Aberdeen.
 1902. Smallman, Raleigh S., Homeside, Devonshire Place, Eastbourne.
 1886. *P* Smith, Edgar A., I.S.O., F.Z.S., Natural History Museum, Cromwell Road, London, S.W.
 1892. Smith, Mrs. Louisa J., Monmouth House, Monmouth St., Topsham, Exeter.
 1899. *L* Smith, Mrs. Lucy A., Cricklade Street, Cirencester.
 1907. Smith, Maxwell, c/o Farmer's Loan and Trust Co. (of New York), 41, Boulevard Haussmann, Paris.
 1894. Smith, Wm. Chas., 7, Vanston Place, Walham Green, S.W.
 1900. Solly, E. H., 3, South Street, Deal, Kent.
 1886. Sowerby, Geo. Brettingham, F.L.S., River Side, Kew, near London.
 1907. Spence, G. C., 27, Pine Grove, Monton, Eccles, Lancs.
 1906. Stalley, Henry J., Thorntona, Oxted, Surrey.
 1886. Standen, Robert, The Museum, The University, Manchester.
 1911. Standish, C. M., Prospect House, Weldbank, Chorley.
 1903. *L* Stelfox, A. W., Delamere, Chlorine Gardens, Belfast.
 1906. Step, Edward, F.L.S., Oakwood House, Ashstead, Surrey.
 1910. Stephenson, H. L., 73, Colwyn Road, Dewsbury Road, Leeds.
 1908. *L* Stobart, H. J. S., Belbroughton, Stourbridge.
 1896. Stonestreet, Rev. W. T., B.D., F.R.S.L., c/o The New Church Book Depôt, 18, Corporation Street, Manchester.
 1897. Stracey, Bernard, M.B., Priory Lodge, 16, New Walk, Leicester.
 1890. Stubbs, Arthur Goodwin, The Meads Cottage, Hailey Lane, Hertford.
 1893. Stump, Edward Consterdine, 13, Polefield Road, Blackley, Manchester.
 1912. Sturt, E. G. M., Lismore, Cavendish Road, Weybridge.
 1912. Sturt, G. L., Lismore, Cavendish Road, Weybridge.
 1895. Swanton, E. W., The Educational Museum, Haslemere, Surrey.
 1888. *P* Sykes, Ernest Ruthven, B.A., F.L.S., 8, Belvedere, Weymouth.
1910. Tattersall, W. M., D.Sc., The Museum, The University, Manchester.
 1895. Taylor, Frederick, 32, Landseer Street, Park Road, Oldham, Lancs.
 1907. Taylor, G. H., School House, Higher Blackley, Manchester.
 1904. *L* Taylor, Gerald Medland, Rossall School, Fleetwood.
 1907. Taylor, J. Kidson, 45, South Avenue, Buxton.
 1901. Taylor, Thos., Tainui Street, Greymouth, New Zealand.
 1903. Thaanum, D., 5, Church Street, Hilo, Hawaiian Islands.
 1908. Thomas, Rev. R. E., M.A., St. Martin's Clergy House, Salisbury.
 1907. *L* Thornton, H. G., Kingsthorpe Hall, Northampton.
 1886. *L* Tomlin, J. R. le Brockton, M.A., F.E.S., Lakefoot, Reading.
 1906. Turton, Lt.-Col. W. H., D.S.O., R.E., 80, Caledonia Place, Clifton, Bristol
1907. Upton, Charles, Homebush, Instow, N. Devon.
1899. Vaughan, J. Williams, J.P., Pen-y-maes, Hay, *via* Hereford.
 1897. Vignal, Louis, 28, Avenue Duquesne, Paris.
 1902. Vincent, W. C. W., 39, West Bank, Stamford Hill, London, N.
1898. Wakefield, H. Rowland, 7, Montpelier Terrace, Swansea.
 1891. Walker, Bryant, 205, Moffat Building, Detroit, Michigan, U.S.A.
 1907. Wallis, E. A., Springfield, West Parade, Scarborough.
 1905. Walton, H. Maurice, Goodburne House, Richmond, Yorks.
 1909. Ward, J. S. M., B.A., The Whym, Gomshall, Surrey.

1905. *L* Watson, Hugh, Bracondale, The Avenue, Cambridge.
 1908. Weaver, G. H., 31, Devonshire Road, Palmer's Green, N.
 1900. Webb, Walter F., 202, Westminster Road, Rochester, N.Y., U.S.A.
 1902. Weeks, Wm. H., jr., 508, Willoughby Avenue, Brooklyn, N.Y., U.S.A.
 1895. Welch, Robert John, M.R.I.A., 49, Lonsdale Street, Belfast.
 1907. Wheat, Silas C., 987, Sterling Place, Brooklyn, N.Y., U.S.A.
 1886. Whitwell, Wm., F.L.S., Brookside, Darley Knowle, Warwickshire.
 1911. Williams, James M. M., Imperial House, Pontllynn, Cardiff.
 1889. Williams, John M., 31, Grove Park, Liverpool.
 1906. Winkworth, John F., 290, Burdett Road, London, E.
 1890. Wood, Albert, Midland Lodge, Sutton Coldfield, Warwickshire.
 1910. Woodcock, R., Fauvic, Jersey.
 1901. *L* Woodruffe-Peacock, Rev. E. A., F.L.S., etc., Cadney, Brigg, Lincs.
 1911. Woods, Rev. F. H., B.D., Bainton Rectory, Drifffield.
 1898. Woods, Henry, M.A., F.G.S., 39, Barton Road, Cambridge.
 1886. *L* Woodward, Bernard B., F.L.S., etc., 4, Longfield Rd., Ealing, W.
 1903. Worsdale, R., 102, Dudley Terrace, Dudley Road, Grantham.
 1906. Wragge, Clement L., F.R.G.S., etc., Perth, Western Australia.
 1895. Wright, Charles East, Woodside, Rockingham Road, Kettering.

COUNCIL MINUTE RESPECTING BRANCH SOCIETIES.

At the Annual Meeting on Oct. 12th, Mr. Masefield raised the question of Branches of the Society, and asked what were the regulations regarding such, and if any affiliation fee was necessary. The Council replied that there were no special regulations, and no fee was required; the only understanding was that the Branches should be officered by members of the parent Society. It was suggested that a note be put in the *Journal* urging the formation of Branches under the above rule.

Helix cantiana Eaten by Birds.—I can confirm Mr. Oldham's and Mr. Leman's notes as to *H. cantiana* forming part of the food of birds. In Sussex, in June last, although I could not find any living specimens, I found plenty of the remains of recently killed ones around "Thrush-stones."—JOHN R. B. MASEFIELD (*Read before the Society*, Nov. 13th, 1912).

Helix cantiana Eaten by Thrush.—The only occasion on which I have observed *H. cantiana* to be preyed upon by Thrushes was at St. Margaret's, Kent, where on September 6th, 1897, I found several broken shells of this species by a "Thrush-stone." This was not a case of "Hobson's choice," as the district abounded in *H. nemoralis*, broken shells of which were also round the stone.—LIONEL E. ADAMS (*Read before the Society*, Nov. 13th, 1912).

DESCRIPTIONS OF TWO NEW SPECIES OF MARGINELLA FROM SAN THOMÉ ISLAND.

By J. R. LE B. TOMLIN, M.A., AND L. J. SHACKLEFORD.

(Read before the Society, Sept. 11th, 1912).

PLATE I (delayed till next number).

Marginella eveleighi n.sp.

Shell somewhat stout, fusiform, shining, white, very finely longitudinally striate; aperture long, narrow; posterior canal somewhat deeply notched; columella strongly four-plaited, the two posterior plaits almost straight, the anterior ones very oblique; outer lip incrassate, broadly margined, rather coarsely denticulate within. Spire rather short, four to five whorled, the apical whorls being vitreous. The suture is well-marked and flattened. The body-whorl is ornamented with eight or nine transverse brown lines continued to the margin and crossed by six undulating longitudinal lines, broadening every now and then into blotches. These also are of a chocolate brown and there are irregularly shaped triangular blotches of the same colour on the upper whorls. The base of the anterior canal is also slightly stained with brown.

Long., 7.25 mm.; diam. max., 4 mm.

Hab.: S. Thomé Island, Gulf of Guinea. Scarce, in coral gravel.

This shell is named after the Rev. G. S. C. Eveleigh, of St. Vincent, C.V., who has rendered us good service in getting West African material.

M. melvilli n.sp.

Shell fusiform, elongate, shining, smooth; spire blunt, three to four whorls; suture hardly apparent; aperture narrow at posterior end, and broadened at the anterior end. Columella strongly four-plaited, the two posterior plaits being nearly straight, the third slightly, and the fourth—the anterior plait—very oblique. Outer lip pure white, incrassate, and very slightly arcuate with fine sage-green markings across the margin, which is somewhat broad. The body-whorl is ornamented with two scalloped bands of clouded brown of varying tints, the tips of the projections being of a deeper brown. Between these two coloured bands at a little below the level of the posterior canal, the pure porcelain white of the ground colour of the shell shows as an apparent white band scalloped on each border. On the penultimate whorl the colour of the band becomes sage-green—the tips of the projections only being brown.

Long., 8.9 mm.; diam. max., 4.5 mm. Hab.: S. Thomé, very rare.

NOTE ON UROCOPTIS LATA C.B. Ad. var. PRODUCTA
C.B. Ad.

By G. C. SPENCE.

(Read before the Society, September 11th, 1912).

FORM "much more elongate [than typical form], sub-conic. A specimen is 1·23 inch long and '34 inch broad" (Adams).

Pilsbry in Tryon's Manual, vol. xv., page 116, adds "Known to me by above note only. It is larger than any form of the species I have seen, measuring about $30\frac{3}{4} \times 8\frac{1}{2}$ mm."

In face of the above meagre notes I was pleased to come across shells labelled "*Cylindrella lata* var. *producta* C. B. Ad., Jamaica," in an old collection of Jamaican land mollusca now deposited in the Manchester Museum. This collection was made by John Jay and

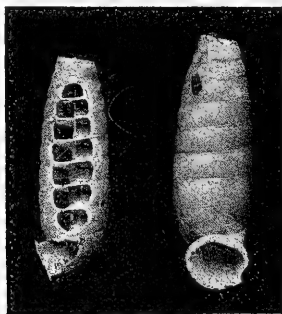


Fig. I.

Fig. II.

many of the specimens probably came from Professor Adams himself, although I do not think there is any documentary evidence of this. It would, therefore, appear that these shells are worth figuring, as unfortunately, in common with many of Adams' species, the description is so inadequate that identification without figures is very difficult, if not impossible.

In the shells under notice the colour and sculpture are as in the typical form. The internal pillar of the specimen examined is also identical, being stout within the last four whorls, with a weak spiral tendency, above which the column rapidly becomes very slender with a slight twist—resembling fig. 51 on Plate 30 of Tryon's Manual, vol. xv.

Figures I. and II. measure $25 \times 7\cdot25$ mm. and $26\cdot5 \times 8$ mm. respectively.

OBITUARY NOTICE.

THE REV. ROBERT ASHINGTON BULLEN, B.A., F.G.S.

BY THE REV. CANON J. W. HORSLEY, M.A.

(Read before the Society, Sept. 11th, 1912).

ON August 14th, the Rev. Robert Ashington Bullen, of Hilden Manor, Tonbridge, died suddenly, shortly after leaving home for a visit to the Continent. Taking a B.A. degree at the University of London in 1873, he entered Holy Orders in the diocese of Canterbury, and served three curacies at St. Peter's, Croydon, Farleigh, and St. Margaret's, Westminster, the last being under Archdeacon Farrar, who was subsequently Dean of Canterbury. He was afterwards Vicar of Shoreham in Kent, Rector of Lower Stukeley in Hants., and Rector of Wisley with Pyrford in Surrey, resigning this in 1905 and devoting his means and leisure largely to natural history and archæological matters.

The writer's first acquaintance with him was when Mr. Bullen, as a young London clergyman, was profoundly interested in the Social Purity question, and later their meetings and correspondence were chiefly due to their membership of the Conchological Society, and his last letter to the writer was a few months ago as to the occurrence of *Helix pomatia* in Shoreham.

A good and interesting man, he took up Conchology with some enthusiasm, and also made an especial study of Holocene deposits, and of British flint implements. In the field he was a painstaking and accurate observer.

CENSUS AUTHENTICATIONS.

BY W. DENISON ROEBUCK, F.L.S., HON. RECORDER.

All the records here given are based upon examples sent to the official authenticators: myself for slugs only; Mr. Fred Taylor for *Paludetrinids*; and Mr. John W. Taylor for all other species.

Co. Carlow: Mr. R. A. Phillips has submitted a dead example of *Planorbis fontanus*, taken at Tinnahinch, March, 1912.

Carnarvonshire: On 12th December, 1910, Mr. Harold King, of Upper Bangor, sent specimens of *Testacella scutulum*, of which he had found five at that place. This is a new record, not only for Carnarvonshire, but for the principality of Wales. At the same time he sent examples of *Helix acuta*, found in 1907, on the sandhills at Nevin.

Channel Isles: We have seen examples of *Phytia myosotis* from Guernsey (Sowerby and Fulton), in the Essex Museum.

Cheshire : Mr. J. Davy Dean has submitted several examples of *Pupa anglica*, collected at Compstall, in 1903, by Mr. J. W. Jackson.

Cheviotland : Mr. A. M. Oliver did good work in August, 1912, near Bamburgh, and sent *Zonitoides nitidus* and *Vertigo pusilla* from Spindlestone; *Vertigo pygmaea*, one from Glororum, and a large colony under stones by roadside near Twizel House, Belford, and one *Sphyradium edentulum* from the last-named locality, *Acanthinula lamellata*, near Twizel House, and *Spharium lacustre* from a pond at Beadnell. He also sent *Anodonta anatina*, *Pisidium amnicum*, and *Planorbis albus*, all common in the river Coquet, near Warkworth, the *Anodonta* being all of small size and brown in colour. As the river Coquet is here the dividing line between Cheviotland and Northumberland South, the species taken are referable to both vice-counties, and therefore they are new for Cheviotland.

He also sent a number of *Hygromia rufescens*, from a garden in Bamburgh village. This completes the range of this species for England, except that we have not seen it from Essex South, and that it does not seem to occur at all in Nottinghamshire, despite the numerous conchologists who have from time to time so thoroughly investigated that county, thus making it a case of real absence, not merely want of record.

Co. Clare : Mr. R. A. Phillips has sent *Paludestrina confusa*, a few, *Phytia myosotis*, numerous, and *Ovatella bidentata*, numerous, all taken at Kilrush, April, 1912. These have been duly verified by Mr. Fred. Taylor.

Devon South : Mrs. Longstaff has sent *Hyalinia radiatula* and its var. *viridescens-alba*, one example of each, taken at Chagford. Mr. J. E. Cooper collected *Valvata cristata* at Colyford, in June, 1912, and sent several examples for authentication.

Durham : Mr. B. R. Lucas has submitted examples of *Hygromia rufescens* taken by him in 1896, near Darlington, where it is very common.

Essex North : Through the kindness of Mr. W. Cole and Mr. H. Whitehead, B.Sc., curators of the Essex Museum, we have seen *Vivipara contecta* and *Paludestrina stagnalis*, taken at Colchester by Mr. H. Laver; *Euconulus fulvus*, West Bergholt and Leigh Wick; and *Ovatella bidentata*, Wyvenhoe.

Essex South : Through the kindness of the same gentlemen, we have been able to authenticate the following species: *Testacella haliotideae*, Widford (W. M. Webb); *Ovatella bidentata*, Foulness (Dalton); *Assiminia grayana* and *Paludestrina stagnalis*, Tilbury Marshes (A. J. Jenkins); *P. ventrosa*, Thurrocks Marsh (A. J. Jenkins); and *Vertigo pygmaea*, Ingrave (W. M. Webb).

Flintshire : Miss A. Steele Perkins, of Mount Road, Rhyl, sent me two consignments of slugs on the 5th and 12th June, 1912, which included three species not hitherto seen and authenticated for Flintshire. These were *Limax maximus*, one type and one adult var. *obscura*, very dark uniform colour, with the keel only slightly paler; *L. flavus*, several typical adults; *Arion intermedius*, a few. Along with these were examples of the already recorded *Arion hortensis*, *A. circumscriptus* and var. *neustriaca*, *Agriolimax agrestis* in both its common forms, and a very minute example of *Milax sewerbyi* var. *pallidissima* sub-var. *insolita*, this last being the striking form of which Miss Perkins sent me so many fine examples in 1904.

Forfarshire : The Conchological Society's voucher-collection at Manchester contains the following in a collection made by Dr. Thomas Scott: *Planorbis fontanus*, one juv., *Pisidium nitidum*, one, both from Balgavie Loch; and *Pisidium subtruncatum*, one from Rescobie Loch.

THE SENSE—AND NONSENSE—OF THE NAMES OF THE BRITISH LAND AND FRESHWATER SHELLS.

(Presidential Address delivered at the Annual Meeting, Oct. 12, 1912).

BY THE REV. CANON J. W. HORSLEY, M.A.

TWICE already has a Presidential Address dealt with the question of the nomenclature of molluscs. In 1896 Mr. J. Cosmo Melvill most learnedly gave an historical sketch of the work of Pre-Linnæan writers on shells, and shewed how the great Swedish naturalist had not only been preceded, but taught, by others who laboured in the field of classification and nomenclature, although the tenth and the twelfth editions of his *Systema Naturæ*, published respectively in 1758 and 1767, are usually regarded as the starting point. The increasing number of observers and their descriptive writings led, however, to such confusion in the way of synonyms, that in 1842, in Manchester, a committee of naturalists, eminent in various branches, was formed, and they produced the same year what is called the Stricklandian Code—from the name of the reporter or secretary. This Code laid down priority of nomenclature as the basis, adopted binomial nomenclature, and restricted names to Latin or Latinized Greek. It also deprecated the use of barbarous and mythological terms; of comparative names, such as those ending in *ides*, *oides*, *formis*; severely discountenanced hybrid and corrupt names, derived partly from Latin and partly from Greek, or partly from English and partly from Latin, and also what they called 'nonsense names'; and advised that names should be derived from persons, only when the persons have deserved such commemoration. Then in 1865 a new and important committee on the subject revised the Stricklandian Code, and *inter alia* gave a list of no less than sixteen classes of objectionable names. Much attention has subsequently been given to the matter in England, America, France, and Germany, and while Mr. Melvill said "the whole array of animated nature is before us, awaiting patiently a valid enrolment and arrangement systematically and physiologically, and the day is sure to dawn when this will be done;" it is satisfactory to note that he also said "the molluscan branch of zoological nomenclature, as regards the genera, seems to be in better case than many of the other sciences." Those of species, and perhaps still more of recognized varieties, may still require attention.

The other, and prior, Presidential Address was that of Mr. Edgar A. Smith, in 1890, on the nomenclature of certain genera of British land and freshwater shells, in which he advocated, or, perhaps we

may say, established the generic names of *Viviparus* for *Paludina*, of *Paludestrina* for *Hydrobia*, of *Vitrea* for *Zonites*, *Acicula* for *Acme*, and *Cæcilioides* for *Cionella* or *Achatina*.

It would be simply ludicrous if I attempted to give you a scientific address comparable in any degree to those of most of my predecessors; but as my delight has been to introduce children and working-men to the study of the shells of their neighbourhood, and then of their native land, it seemed to me that, bearing them, and not scientists, in mind, I might do a useful work by extending their interest and knowledge of the objects of their pursuit by letting them know the meaning of the names they have to use—which are entirely taken from two languages, of which most of them know nothing. Quite recently I had a fascinated small student who, when I found *Cyclostoma*, called it cyclometer, but when I repeated the name and gave its meaning his intelligence advanced, whereas otherwise only his memory would be burdened. It will not, however, be a mere glossary or list of meanings which I shall essay, since history is sometimes wrapped up in appellations, or valuable faunistic information given. To those who know more than I do as conchologists this paper will be useless; but they will bear with it for the sake of those who, as beginners, know less, and are sometimes even repelled at first by having to remember names which they can neither understand nor always pronounce. Help them to understand, and from their ranks will the more surely come those who will emulate, and even surpass, the teachers of to-day.

I take, therefore, our Society's Name List of 1904, for which we are mainly indebted to Mr. B. B. Woodward, and I translate, interpret, and in some cases comment on, all the names therein given.

All our British non-marine shells belong to two great classes, *Gastropoda* and *Pelecypoda*, the former being univalves, the latter bivalves. *Gastropoda* means stomach-footed, because on the ventral side of the body a sole-like disc or foot exists, by the wavelike expansions and contractions of which the animal progresses. We begin with the division *Pulmonata*, i.e., those breathing air, or obtaining oxygen by means of a lung or air sac.

Of these the first division is that of *Stylommatophora*, i.e., bearing their eyes on or near the tips of their tentacles.

The first family on our list is that of *Testacellidæ*, represented by the single genus *Testacella*. *Testa* is Latin for a shell, *testacella* a little shell, a name given by Cuvier in 1800, because this slug bears a small external shell. Its species *maugei* was first found at Teneriffe, by M. Mauge. Its var. *viridans* means greenish. The second species *haliotideæ* means having a shell in the *idée*, or form, of the

marine shell *Haliotis*, the meaning of which again is the ear-shaped sea shell. The third species *scutulum* derives its name from *scutum* a shield, *scutulum* a little shield.

The next family is that of the *Limacidae*, in which the first genus is *Limax*. This name was hardly "originated or instituted by Linné," as Mr. J. W. Taylor says. It was the old Latin name for a slug, derived from *limus*, or mud. Thus Varro writes, *limax a limo quod ibi vivit*, and Festus, *limaces cochleæ a limo appellatæ*, "slugs are shells named from mud." The first species is *maximus*, i.e., the greatest. The variety first named on our list is *cinereo-niger*. This means ashy-black, but is one of those undesirable compound names which remind us of nurserymen's Latin. The name was given by Wolf in 1803, but its colour varies much—black, white, yellow, red, grey, and brown. The var. *ferussaci* was named by Moquin-Tandon, in compliment to Férussac, another great French conchologist, whose son continued his work. Var. *krynickii*, named after Krynicky, an authority on Russian non-marine shells. Var. *fasciata* = banded. Var. *maculata* = spotted. Var. *rufescens* = reddish entirely. Var. *cellaria* = found in cellars, though not so definitely or exclusively as to warrant the name. Var. *candida* = white. This species—*maximus*—belongs to the sub-genus *Heynemannia*, so named after the great limacologist of Frankfort.

Of *Lehmannia*, the first species is *flavus*, i.e., yellow. Its var. *virescens* means greenish; but the coloured figure in Taylor's Monograph hardly bears out the name. Var. *suffusa*, i.e., suffused, the darker shade overspreading or suffusing, and so obliterating the spots which are characteristic of the normal *L. flavus*. The vars. *rufescens* and *maculata* have already been interpreted, and only on the first occurrence of a name will its meaning be given. The next species is *arborum*, i.e., frequenting trees. Its var. *nemorosa* means inhabiting groves. Var. *rupicola* = inhabiting rocks. Var. *pallens* = pale, paler than the type. Var. *alpestris* = found in the Alps, or high places.

The genus *Agriolimax* comes next. The name means field-slug. Its first species is *agrestis*, inhabiting fields. Var. *sylvatica* = found in woods. Var. *punctata* = spotted, with black. Var. *nigra* = black. Var. *lilacina*, called by Mr. Taylor *violacea*. It is lilac or slate-coloured rather than violet. Named *violacea* by Gassies in 1849; but Moquin-Tandon in 1855 more correctly called it *lilacina*. Var. *albida* = whitish. Var. *reticulata* = marked like network, or, as Mr. Taylor says, "with interstitial lineolation." Var. *tristis* = sad, i.e., sad-coloured. Var. *obscura* = hidden.

The next species is *lævis*. This spelling is an erroneous form of the Latin *levis*, probably adopted to distinguish the two words *lævis* smooth, and *lêvis* light. The epithet *lêvis* has priority, but the *brunneus* (an unclassical name for brown) of Draparnaud in 1801 is more descriptive.

The genus *Milax* is an utterly unmeaning and artificial word, made by Dr. Gray, who ought to have known better, by transposing the letters of *Limax*. The name *Amalia* (I presume from the Greek ἀμαλός, tender, soft) was given by Moquin-Tandon when he separated it from *Limax*. Its first species is *sowerbyi*, named in 1823 by Férussac, from specimens sent by Mr. G. B. Sowerby from near London. It has a var. *carinata*, i.e. keeled, with a ridge on its upper surface, and another *nigrescens*, i.e., approaching black. The other species is *gagates*, from the Greek word for lignite or jet. It varies from black to brown. Var. *plumbea* = lead-coloured.

We come next to the family *Zonitidæ*. *Zonites* means girdle-like, i.e., circular.

The first genus is *Vitrina*, from *vitrum*, glass. Its sole species is *pellucida*, i.e., transparent, an appropriate name, first given by Müller in 1774. Its var. *depressiuscula* bears a very unclassical name, denoting somewhat flattened. Its var. *dillwynii* was named by Jeffreys after Dillwyn (1788-1855), a celebrated conchologist, who was M.P. for Glamorganshire.

The genus *Vitrea* (glassy) is represented by the species *crystallina*, of which one variety is called *complanata* = levelled, i.e., with the upper side quite flat, and the other *contracta*, i.e., with whorls little increasing in size.

In the sub-genus *Polita* (polished) there is the species *lucida*, i.e., transparent, though the shell is scarcely semi-transparent, and comparatively thick and strong. Draparnaud (after whom this shell used to be called *draparnaldi*) is responsible for the name. It has a var. *albina*, i.e., whitish. The species *cellaria* is supposed, by its name, to inhabit cellars, which it occasionally does; but in classical Latin a room, and especially a store-room or pantry, is meant by *cella* and *cellarium*. I found it under the stone lid of a manhole in the drain of S. Peter's Rectory, Walworth—the only shell left in that part of London.

Rogersi, till lately known as *glabra* or *helvetica*, was so named in 1903 by B. B. Woodward, after Mr. Thomas Rogers, of Manchester, who first noticed the shell as differing from its related *alliaria*. Mr. Taylor, however, in his Monograph gives reasons for its being called, as before, *helvetica*, i.e., from Helvetia or Switzerland, where Dr. Blum, of Frankfort, first found it.

Alliaria, i.e., smelling of garlic, was so named by Mr. J. S. Miller, of Bristol, in 1822. It has a var. *viridula*, i.e., greenish.

Nitidula, i.e., somewhat glossy, has a var. *nitens*, i.e., shining, though the differential character of the shell is not its lustre, but the greater amplitude of the last whorl. The species *pura* derives its name from both the body and the shell being white. Its var. *nitidosa* is of a clear fawn or horn colour. The word is unclassical Latin for shining, and it is to be deprecated that in this small sub-genus we should have *nitidula*, *nitens*, *nitidosa*, and *nitidus*, as specific or varietal names, when the name of the sub-genus—*Polita*—indicates for all that they are polished or glossy.

The species *radiatula* is named from the shell being finely radiate in its striation. The var. *viridescenti-alba*, i.e., greenish-white, of Jeffreys, may be but a sub-variety of var. *viridula*, first described by Menke in 1830.

The genus *Zonitoides* ("like Zonites") contains *nitidus* and its var. *albina* and *excavatus*, i.e., hollowed out, with a very wide umbilicus. The genus *Euconulus* means pretty little conical shell, while *fulvus* is tawny. The name *Mortoni* was given to a variety by Jeffreys, possibly in honour of the Rev. J. Morton, who wrote in 1712 on the natural history of Northamptonshire; and that of var. *Alderi* by Gray in his 1840 edition of Turton's Manual after Joshua Alder, the great Newcastle authority on the *Nudibranchiata* or "sea-slugs."

We come next to the family of *Arionidae*. The Greek name *Arion* is historically given to a certain musician and a certain swift steed—neither of whom naturally suggest a slug. The 'i' should be short by-the-bye, and the accent on the first syllable. People have been misled by recollections of the name Orion given to a constellation. The species *ater*, i.e., black, was named *Limax ater* by Dr. Lister in 1674. It usually, in England, deserves its specific name, but is also white, red, lead-coloured, chocolate, and parti-coloured. Of the ten varietal names given in our catalogue (sixteen in Taylor's Monograph), those not already translated or explained are *flagella*, concerning which Mr. J. W. Taylor writes to me: "It was so named by Mr. Collinge, from his belief that this type specimen possessed a flagellum on the oviduct. I have pointed out the unlikelihood of this, and Dr. Scharff who examined the type dissection, denies that the so-called flagellum is anything but tissue;" *lusitanica*, i.e., found in Portugal; *bicolor*, two-coloured; *swammerdami* of Kalaleniczenko, named after the German naturalist, whose *Biblia Naturæ* was published in 1737. The species *subfuscus* = somewhat brown. Var. *aurantiaca* means golden-hued—*aurata* would be classical Latin. The species *elongatus* = lengthened—not classical Latin.

The species *intermedius*, i.e., intermediate, bears a name which says nothing, for one is not told between what species it was considered intermediate. The species *hortensis*, i.e., frequenting gardens, has two varieties named by Pollonera, *celtica* and *cottiana*, as having been first noticed in a Celtic region and in the Cottian Alps about Mt. Cenis. Another variety is *cærulea*, i.e., blue. The species *fasciatus* has a var. *circumscriptus*, i.e., trimmed round, perhaps in allusion to the footsole being white, which, however, is characteristic of the type, and not merely of the variety.

The genus *Geomalacus* contains but one species, and the name means in Greek the earth-mollusc. The specific name *maculosus* means spotted.

The family of *Endodontidæ* (having teeth within) has a jaw formed of a series of quadrate plates. The genus *Punctum* gets its name from its small size—a point, and its specific name *pygmæum* denotes also its small size. The Romans used Aristotle's Greek name of *Pygmaï* for the dwarf tribes of Africa, of which he probably knew more than discoverers of the nineteenth century imagined.

Sphyradium, a name given by Agassiz, may be derived from σφύρα, a hammer, or from σφύρας, sheep's dung, but the connection or similarity is not plain. Meditating, however, on the subject in a sheep-pasture, I am inclined to adopt the latter derivation, since sometimes aggregated pellets of sheep's dung are not unlike a very much magnified *Vertigo*, with tumid whorls. Its specific name *edentulum* denotes the absence of teeth. Its var. *columella* is lengthened, and so more columnar in shape.

The genus *Pyramidula*, i.e., pyramidal, contains in England only *rupestris*, i.e., rock-loving. A more descriptive name than many, although found also on stone walls, and in one case by me on a brick wall in Sussex. Its var. *trochoides* is like a *Trochus* in shape.

The sub-genus *Gonyodiscus* indicates that it is like the sub-genus *Discus* (disk-like), but the periphery of the whorls is angulated. *Rotundata* = rounded. Its var. *turtoni* was so named by Fleming in 1828, after Turton, who published his great *Conchylia Insularum Britannicarum* in 1822. The "monster" *scalaris*, i.e., whorls mounting like a ladder.

Next comes the great family of *Helicidæ*. The genus *Helicella* was so named by Férussac in 1819, who probably used the diminutive because most in this group are smaller than the true *Helices*. The section *Heliomanes*, i.e., mad for the sun, indicates the habit of not shrinking from the light and heat, while the old name for the genus was *Xerophila*, i.e., loving dry things, since as food dry stalks, and other dry things, such as printed matter, are often preferred to more succulent vegetation.

Our species *virgata* bears the name meaning striped, a term applied by Da Costa to this member of the large group of *Pentatania*, or five-banded shells. Its varietal names not already explained are *subaperta*, somewhat open, i.e., with an umbilicus wider than usual; *subglobosa*, somewhat globular; *carinata*, with a (peripheral) keel; *lineata*, marked with lines thinner than the usual bands; *leucozona*, with a white (peripheral) zone, the rest of the shell being dark violet; *rufulozonata*, with a reddish zone; *radiata*, with bands broken up, so as to give a rayed appearance from the apex downwards; *lutescens*, yellowish; *hypozona*, with bands only below the periphery; *epizona*, banded (or blotched) above the periphery, but white below; *subalbida*, the name given by Poiret to a variation not "rather whitish," but with one band on a white shell; *albicans*, growing white (the nucleus is dark); var. *alba* is really white, including the apex.

The subsection *Helicella* contains *itala*, i.e., Italian, so named by Linné who probably received it first from Italy. Müller's later name of *ericetorum* (inhabiting heaths and downs) is more significant of its usual habitat. Var. *instabilis*, i.e., fluctuating, not adhering to the typical form in size, shape, or colour. Var. *lentiginosa*, not from *lens*, a lentil, as L. E. Adams says in his glossary in his "Collector's Manual," but from *lentigo*, a freckle, or a lentil-shaped spot. It has freckle-like markings, radiating from the centre.

The genus *Candidula* (members mainly whitish) is represented in England by *caperata*, i.e., wrinkled, with a close and regular striation. The name is derived from the late Latin verb *capero*, to wrinkle, which probably was formed with reference to the wrinkled horns of a goat (*caper*). Var. *subscalaris* is somewhat scalariform. Var. *bizonalis* has two broad bands above the periphery. Var. *ornata* is ornamented with one such band. Var. *obliterata* has markings absent or obliterated, translucent, but not coloured. *Turricula* means a little tower. Our species is *elegans*. The type has a chocolate band on each whorl; the variety *grisea*, equally abundant, is yellowish grey. Well established near Dover, and first found by Capt. Dakin, by whom specimens were sent to me for identification.

The genus *Cochlicella* (little shell) bears a Greek name with a Latin diminutive termination. Its English representative, *barbara*, i.e., foreign, is perhaps named from its being by origin not a northern shell. It has various varieties, *inflata*, inflated in the last whorl; *bizona*, with two bands instead of the normal one on the last whorl; *flammulata*, like the last but with the bands interrupted so that the markings are flame-like in shape; *strigata*, which is supposed to mean streaked. Vitruvius has the word *strix*—"a furrow or groove"—from which comes the late Latin word *strigatus*, which however means

larger (from north to south) than broad. Var. *articulata*, i.e., jointed, was so named by Lamarck, who probably meant to indicate that it has alternate transverse ribs of white and violet-brown.

The genus *Theba* Leach in his synopsis prints "Teba." It is suggested that it is named after Thebes; but then it would be Thebæ or Thebe. It has two representatives, *cantiana*, which derives its name from having been first noticed in Kent. Var. *galloprovincialis*, i.e., found in the Gallic province, later called Provence. Var. *albocincta*, i.e., girdled with white, from the reddish colour being absent on the periphery. *Cartusiana*, i.e., found near a Carthusian monastery. Var. *lactescens*, i.e., becoming milky in colour; var. *leucoloma* means bordered with white, i.e., having a white peristome or rib; var. *rufilabris*, i.e., with red lips.

The genus *Hygromia* (i.e., frequenting damp places) has the section *Fruticicola*, orchard inhabiting, with the species *fusca*, i.e., dusky brown; *granulata*, i.e., minutely granulated, like shagreen where the hairs have worn off (named by Jeffreys *sericea*, i.e., silky, in allusion to the soft hairs it bears); *hispida*, i.e., hairy (the same as Jeffreys' *concinna*, i.e., neat). Var. *depilata* denoted that no hairs are found. Dr. Gray in Turton calls it the "bald snail." Var. *nana* is a dwarf, or smaller than the type.

(To be concluded).

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(LIMITED TO WORKS RECEIVED BY THE SOCIETY'S LIBRARIAN).

Monograph of the Land and Freshwater Mollusca of the British Isles, part 19 (pp. 369-416, and 4 plates), by JOHN W. TAYLOR (Taylor Bros., Leeds).

Every part of Mr. Taylor's work is eagerly welcomed, and none more than those dealing with the *Helicidae*. Part 19 furnishes us with complete monographs of *Helix pisana* Müll. and *Helicigona lapicida* L. Of the four plates, No. 15 takes us back to the *Zonitida*, and is Mr. Taylor's own attempt to give reliable figures of *Hyalinia*, *Zonitoides* and *Euconulus*. We congratulate him on a very successful and artistic result. Another plate gives us the Distributional Map of *H. pisana*. We are a little surprised to see co. Kerry coloured in this map, when the authenticity of the record seems so doubtful. May it not be explicable on the same hypothesis as the West Galway record? All collectors will welcome the two very beautiful coloured plates on which are figured the type and thirty-seven named varieties of *H. pisana*. Altogether, this part is an excellent piece of work.

Clare Island Survey, part 23, **Land and Freshwater Mollusca**, by A. W. STELFOX (from *Proc. Royal Irish Academy*, vol. xxxi.), 64 pp., with 2 plates (Hodges, Figgis & Co., Ltd., Dublin: Price 2/-).

The survey of Clare Island and the adjacent mainland of West Mayo was first undertaken in 1909, to "furnish a study of a typical area of the west coast of Ireland." Sixty-eight parts have already been issued, all prepared by specialists, and dealing with practically every group of the fauna and flora. This particular monograph, although concerned with but a small area, discusses problems of intense interest to the student of the geographical distribution of the mollusca. We recently had occasion to congratulate Mr. Stelfox on his excellent Irish list, and we are now delighted to welcome another contribution on the Irish molluscan fauna—equally thoughtful, thorough, and exhaustive.

One of the most attractive features of shell-collecting in Ireland is the comparatively slight influence hitherto exercised by man on geographical distribution. The effect of man's presence on our land and freshwater shells is only just beginning to be taken seriously into account, but the importance of this line of study is well summed up in Mr. Stelfox's dictum that "the final aim of geographical conchologists is to determine the natural range of a species before man's influence acted upon it," and he is careful to eliminate all records for this area which are probably due to human agency.

We are very glad to see separate lists of species given for every island that has been explored, as well as for the various mainland districts. We should like to give the most emphatic approval to another remark by the author, in describing the subdivision of the district. "Each island naturally forms a district in itself, no matter how small it may be in area."

The Marine Mollusca of the Scottish National Antarctic Expedition, part 2 (with 1 plate,) by J. COSMO MELVILL, M.A., D.Sc., F.L.S., and R. STANDEN.

The Brachiopoda of the Scottish National Antarctic Expedition (with 2 plates,) by J. WILFRID JACKSON, F.G.S. (both from *Trans. Roy. Soc., Edin.*, vol. xlviii., part 2). Robert Grant & Son, 10', Princes Street, Edinburgh.

The first part of Messrs. Melvill and Standen's paper was published in *Trans. Roy. Soc., Edin.*, vol. xlv., in 1907. In the present part over twenty new species are described, a complete list is given of the species obtained by the expedition, and the bibliography is completed up to 1912.

Finally there is a plate of all the new species, which seems to us about the most successful specimen that we have seen of Mr. Searle's art. The whole part is a most valuable contribution to our knowledge of the fauna of the Antarctic and reflects great credit on the authors.

The same may well be said of Mr. Jackson's paper on the Brachiopods. Only one species and one variety are described as new, but there is much valuable information as to the distribution of previously known forms, and especially as to the development of the internal structure of certain species at different stages of growth. We must congratulate Mr. Jackson on the excellence of his photos, which could hardly be improved upon; we had the pleasure of examining the beautiful shell-mosaic of several of these species when the author was at work on his paper, and can testify to the thoroughness and soundness of his methods.

CYPRÆA CAURICA L. var. ROSEA nov.

By J. KIDSON TAYLOR.

(Read before the Society, November 13th, 1912).

I HAVE what I believe to be an unnoticed and hitherto undescribed colour variety of *Cypræa caurica* Linné, a generally abundant and common species in the eastern seas.

In this variety the back or dorsal region of the shell is of a beautiful rosy-flesh colour, quite distinct from the normal, typical colouring of this species. The ground-colour is profusely sprinkled, all over its surface, with minute dots of a deeper shade of the same rosy colour; in shape this variety is that of var. *oblongata* Melv., but with slightly thicker side margins, which are ornamented by a few scattered reddish brown spots, some of which are partly obscured by the enamel.

The base of the shell and teeth are white, the interstices of the latter being of a very faint tint of pale flesh colour.

One of the specimens is very remarkable in being distinctly three banded; these bands are quite sharply defined on the ground-colour, with the small dots almost obsolete, thus bearing quite a close resemblance to *C. carneola* Linné.

The three shells are quite full grown, and not immature as at first sight would appear.

Their habitat is the Island of Mauritius, a locality from which so many beautiful, pellucid forms have been obtained.

The dimensions of the largest of the three specimens, are: Length 51 mm.; diam. 27 mm.

For this variety I propose the varietal name *rosea*, as indicating the general appearance of the shell.

The typical form of *C. caurica* is oblong-oval, the lateral margins very strongly thickened, base flesh-coloured, with the teeth strong and white; back whitish, with three more or less distinct bands irregularly speckled with fulvous small dots, occasionally forming a large central blotch; the margins irregularly spotted with large purplish-brown blotches.

There are five named varieties already described viz:—

var. **concava** described in 1870, by Sowerby (from H. Owen's MSS.) in his "Thesaurus Conchyliorum;" a subrostrated monstrosity of small size from Gambia, W. Africa.

var. **obscura** described in 1882, by Rossiter in Proc. Linn. Soc. N.S.W.; a blackish-brown, narrow-margined form from N. Caledonia.

var. **oblongata** described in 1888, by Melvill, in Survey of Genus *Cypræa*, Proc. Lit. and Phil. Soc. of Manchester; an oblong thinner shell, with less thickened sides, frequently of large size.

var. **cairnsiana** described by Melvill & Standen, and named after the late Mr. Robt. Cairns, a small thickened shell, with bright orange base, from Persian Gulf, Borneo and East Indies.

var. **pallida** described by Dautzenberg, in Revis. N. Caledonian *Cypræidæ* in 1902, a white variety, from N. Caledonia.

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN & IRELAND.

415th (Annual) Meeting, Oct. 12th, 1912.

Held in the Linnean Society's Rooms, Burlington House, London, W.

The Rev. Canon J. W. Horsley in the chair.

About 50 members and a few visitors signed the roll.

Amongst those present were the following :—Rev. J. W. Horsley, Rev. E. W. Bowell, Messrs. L. E. Adams, H. Beeston, C. A. Benn, W. W. Bladen, E. D. Bostock, A. E. Boycott, C. N. Bromehead, R. M. Christy, J. E. Cooper, J. C. Dacie, W. J. Davey, H. J. Durrant, T. Edwards, W. T. Elliott, H. C. Fulton, G. K. Gude, P. Harwood, G. Humphreys, B. D. Jackson, J. W. Jackson, F. B. Jennings, A. S. Kennard, P. Lawson, G. C. Leman, E. D. Marquand, J. R. B. Masefield, J. Moorcock, J. F. Musham, H. C. Napier, R. B. Newton, C. Oldham, A. M. Oliver, H. W. Parritt, H. B. Preston, P. E. Radley, W. G. Reynolds, W. D. Roebuck, A. E. Salisbury, A. Sich, F. H. Sikes, E. A. Smith, G. L. Sturt, J. W. Taylor, J. R. le B. Tomlin, W. C. W. Vincent, G. H. Weaver, R. Welch, and C. E. Wright.

Appointment of Auditors.

Messrs. F. Taylor and C. H. Moore were appointed Auditors.

Appointment of Scrutineers.

Messrs. J. R. B. Masefield and A. S. Kennard were appointed Scrutineers.

New Members Elected.

Miss Florence Jewell.

Percival Ross Frames.

Reports.

The various Reports adopted at the Council Meeting were taken as read.

Election of Officers and Council.

The Scrutineers reported that the Officers and Council for the year 1912-1913 had been elected as nominated by the Council (see p. 2).

President's Address.

The Rev. Canon J. W. Horsley, M.A., gave his Presidential Address on "The Sense and Nonsense of the Names of British Land and Freshwater Shells."

Mr. J. R. B. Masefield was then voted to the chair.

On the motion of Mr. J. W. Taylor, seconded by Mr. Peter Lawson, a vote of thanks was passed unanimously to Canon Horsley for his Address.

Mr. A. S. Kennard proposed and Mr. W. C. W. Vincent seconded a vote of thanks to the Council of the Linnean Society and their Secretary, Dr. B. D. Jackson for the use of their rooms for the Annual Meeting.

Mr. J. W. Jackson proposed and Mr. J. Moorcock seconded a vote of thanks to the Vice-Chancellor of Victoria University and the authorities of Manchester Museum for the use of rooms in the Museum for the meetings of the Society.

A vote of thanks was also passed to the Vice Chancellor of the Leeds University for the use of a room in the University Buildings for the meetings of the Leeds Branch.

Exhibits.

By Rev. Canon Horsley: Map, probably incomplete, of the distribution of *Helix pomatia* in Kent, showing curious gap between the two centres, although the conditions of soil, aspect, &c., are the same.

By Mr. W. D. Roebuck: (1) Four maps to show the boundaries of counties and vice-counties as employed in the census; (2) Book of maps of authenticated records as far as the collation has gone; (3) Various maps to show blanks that need filling up for various species, mostly of probably general distribution.

By Mr. L. E. Adams: *Helicella caperata* from Reigate; *H. heripensis* Mab. from various English localities; *Melanopsis dufouri* Fér. from Biskra.

By Mr. J. C. Dacie: Extensive series of *Littorina rudis* and *L. obtusata*; varieties of *Purpura lapillus* L. from Folkestone and elsewhere; *Cypræa decipiens* Smith; and a very curious variety of *C. arabica* L.

By Mr. W. J. Davey: Fine examples of several species of *Spondylus*; also large specimens of *Pholas costata*, *Cardium pseudolina*, *Malleus vulgaris*, *Fissurella crenulata*, and *Murex regius*. Several species of *Achatina* and a series of *Amphidromus*.

By Mr. Thomas Edwards: An exceptionally fine series of monstrosities of *Buccinum undatum*, dredged off the Isle of Thanet, including m. *sinistrorsum*, m. *acuminatum*, m. *carinatum*, m. *scalariforme*, m. *bioperculatum*, and m. *carinatum* + *acuminatum*.

By Mr. G. K. Gude: A very complete collection of *Corilla* and *Plectopylis*.

By Mr. H. C. Huggins: British Land and Freshwater Shells, including *L. stagnalis* var. *variegata* and var. *picta*, Chesham; *L. palustris* var. *albina*, Southport; *B. tentaculata* var. *picta*, Palmer's Green; *V. contexta* var. *atropurpurea*, Wicken; *H. aspersa* var. *monozona*, m. *scalariforme* and var. *exalbida*, *H. nemoralis* m. *sinistrorsum*, Gravesend; var. *vinosozonata*, Gravesend; var. *clitrinozonata*; *H. hortensis* var. *roseozonata*, Eastbourne; *H. arbustorum* var. *canigonensis*, Ewell; *H. revelata*, Porthcurnow; and malformations of *Clausilia biplicata*.

By Mr. J. W. Jackson: Series of Pleistocene shells from Dog Holes Cave, Warton Crag.

By Mr. F. B. Jennings: *Helix nemoralis* var. *aurantia* from Edmonton.

By Mr. Peter Lawson: Two drawers of small shells, including *Nerita*, *Neritina* and other foreign marine species, also a watch-chain made of shells.

By Mr. J. R. B. Masefield: *Testacella scutulum* and *Vertigo antivertigo* from Cheadle, Staffs.

By Mr. J. F. Musham: Shell necklaces, made by the children on the island of Iona, and composed of *Helix nemoralis*, *Helicella itala*, *H. acuta*, separate, as well as mixed with *itala*. These were formerly sold to the visitors and tourists, but are now seldom offered, and therefore scarce and difficult to procure. They are relics of an old-established custom dating from the time of the monkish occupation of the island, shells and jade pebbles being in great request as mementoes. A small collection of Iona shells, shewing the more conspicuous varieties. Attention was drawn to their bleached appearance, through the continuous effects of wind-driven sand.

By Mr. W. G. Reynolds : Series of *Helicella virgata* from Rye, Sussex.

By Mr. F. H. Sikes : Some remarkable forms of *Helicigona arbustorum* ; varieties of *Helicella cantiana* and *H. cartusiana* ; non-marine shells collected in Iceland during August and September, 1912.

By Mr. R. Standen : *Aporrhais fespelicani* from Southport, showing growth stages and *A. serresianus* from Tearaght (W. Ireland) ; *Trivia europæa* var. *arctica* and var. *minor* from Jersey ; also a series illustrating growth stages from Jersey and Plymouth ; *Jamnia cylindracea* var. *albina* from Keswick and Blackington, and embryonic shells from Oban ; a series of *Sphærium pallidum* from various localities ; and a remarkable series of *Dreissensia polymorpha* Pallas, from canal at Woodplumpton, Lancs., especially selected to illustrate the extraordinary variation in shape occasionally assumed by this polymorphic mussel in certain localities (vide *J. of C.*, vol. xi., p. 84).

By Mr. A. W. Stelfox : *Helicella heripensis* Mab., *Planorbis vorticulus* Troschel and *Valvata macrostoma* Steenbuch.

By Mr. J. W. Taylor : Photomicrographs of radula and maxilla of *Helicigona arbustorum* (photos by Mr. W. Bagshaw, F.R.M.S.).

By Mr. J. R. le B. Tomlin : A series of about 35 *Pholadidea loscombiana* Goodall from Torbay, from very young examples upwards ; British examples of *Ianthina rotundata* Leach, *I. exigua* Lam. and *I. pallida* Harvey ; "live" series of *Scala clathrus* L., *S. trevelyana* Leach and *S. clathratula* Ad. ; Madeiran species and varieties of *Pupa*, recent and fossil (*P. degenerata* Woll. only wanting), including *P. abbreviata* Lw., *P. gibba* Lw., *P. cassidula* Lw., *P. lamellosa* Lw., *P. relevata* Woll., *P. linearis* Lw., and *P. deformis* Woll.

By Mr. W. C. W. Vincent : *Helicella caperata*, a sinistral specimen from Frinton-on-Sea, Essex ; *Helix hortensis*, a scalariform example from Lee, N. Devon. ; series of *Ostrea edulis* from Whitstable, to illustrate growth periods ; *Olividae* from Seychelle Is., and other shells.

By Mr. R. Welch : *Vertigos* and other small non-marine shells from Holocene and recent "pockets" in the sand-dunes of North and North-west Ireland.

By Mr. C. E. Wright : Series of *Helicella caperata* with some *H. heripensis*, from several localities ; *Helicigona arbustorum*, a sinistral specimen from Denford, Northants., also an example showing a second band ; series of *Helix hortensis* from Hunts., and *H. nemoralis* from Northants. ; also a fine collection of molluscan eggs.

By Mr. C. E. Wright (on behalf of Mr. C. P. Jenkinson) : Albino shells of *Helicella cantiana*, *Planorbis corneus*, *Limnea stagnalis*, *L. palustris*, *L. peregra*, and *L. auricularia* all from Northants.

By Mr. C. E. Wright (on behalf of Mr. M. H. Smith) : *Helicella itala* (sinistral) ; a monstrosity of *Helix aspersa* ; a beautifully banded *Limnea stagnalis* ; a scalariform *Planorbis carinatus* ; series of *Sphærium lacustre* and *S. corneum*, all from Northants.

By Mr. J. E. Cooper : Photomicrographs of molluscan radulæ, and photos of various shells ; sixteen species of *Obba* ; *Corasia psittacina*, *C. regine* and its var. *alma*, *Chloræa cærulea* ; several of the rarer species of *Helicostyla* ; also *Choanopoma pulchrum*, *C. hystrix* and *C. echinus*.

ANNUAL REPORT.

At the date of the last Annual Meeting the number of members, including Honorary Members, was 339. During the year six have been removed by death, and the names of two others have been struck off the list for non-compliance with

the conditions of membership. Nine new members have joined the Society, so that the list now stands at 340, this being a gain of one on the previous highest record.

The members whose loss by death the Society deeply laments are Mrs. Fisher, Mrs. Powell, Miss Lodder, Robert Cairns, J. W. Baldwin, and the Rev. Robert Ashington Bullen. Obituary notices of the last three have appeared in the *Journal of Conchology*, and in all cases the Council has sent letters of condolence to the relatives of the deceased. The loss of such men as Robert Cairns and J. W. Baldwin, is all the more deeply deplored, because each had taken such a personal interest and active part in the affairs of the Society. To Miss Lodder's industry and intelligent collecting the list of the Tasmanian Marine Mollusca owes much of its completeness, a fact recognised in the founding of a new genus *Lodderia*, by Prof. Ralph Tate in 1899, for some species formerly placed under *Liotia*.

The usual meetings have been held, and the attendances have been well maintained. Some thirty-one papers and notes have been read before the Society for publication in the *Journal* at the Editor's discretion. At the meetings there have been the following special exhibits:—The genus *Eucalodium* and its allies, Japanese Land Shells, varieties and locality sets of *Hygromia rufescens*, *Cochlostyla*—sections *Chloræa* and *Corasia*, Japanese and Chinese *Clausilia*, Scandinavian Land Shells.

One of the most noteworthy exhibits of the year has been that of the Marine Mollusca obtained by the Scottish National Antarctic Expedition, 1902-1904 (S.V. "Scotia"), examined and reported on by Dr. J. Cosmo Melvill and Mr. Robert Standen; the Brachiopoda obtained by the same Expedition being examined and described by Mr. J. Wilfrid Jackson. Their papers appear in the Transactions of the Royal Society of Edinburgh, 1912. Many very interesting Antarctic records are made for species previously known from other localities, and some twenty species, new to science, are described and figured. Valuable information as to the distribution of Mollusca has been obtained through the examination of these Antarctic collections.

From the Gulf of Guinea four new species of *Marginella* have been described by Messrs. Tomlin and Shackelford, the types being exhibited at the May and September meetings.

The February meeting was held at the Leeds University, at the invitation of the Leeds Conchological Club, an interesting address, illustrated by drawings, being given by Mr. J. W. Taylor, F.L.S., on the Life-history and Habits of *Hygromia rufescens*.

A field meeting was held at Grange-over-Sands, many members from Lancashire and Yorkshire attending.

The *Journal of Conchology* has been issued quarterly, the thirteenth volume being completed with the October number. Many valuable articles and notes have been published, but the Council would again urge members to contribute more frequently the results of their researches and study, and especially to communicate any short notes of observations on the life-history, habits, and malacological characters of Mollusca.

The Honorary Recorder presents his own report, but the Council desires to emphasize the necessity that all new records should be communicated to him as early as possible, that the census, when published, may be an exhaustive one.

During the year a number of specimens has been added to the Society's collections by various members, including some of special interest, and a number of "Voucher" specimens have also been received through the Hon. Recorder.

As it might be of interest to mention a few of the more important works in the "Boog Watson" Library, a short list is given below.

Poli : Testacea Utriusque Siciliae, etc., 3 vols.

Sowerby : Thesaurus Conchyliorum, 5 vols.

Palæontographical Society, 60 vols.

Lamarck : Histoire Naturelle des Animaux sans Vertèbres, 2nd Ed., 11 vols.

Deshayes : Description des Coquilles Fossiles des Environs de Paris, 3 vols.

Bellardi and Sacco : I Molluschi del Terreni Terziari del Piemonte, etc., 30 pts.

Kiener : Spécies Général et Iconographie des Coquilles vivantes, 12 vols.

Hoernes : Die Fossilen Mollusken des Tertiär-Beckens von Wien, etc., 2 vols.

Delessert : Recueil de Coquilles décrites par Lamiarck, etc., et non encore figurées, 1 folio.

RECORDER'S REPORT.

The Recorder reports that a considerable number of records has been made and authenticated during the year, and some of them published and to be published in the *Journal of Conchology*.

Statistics are not now given, inasmuch as the Recorder is making a careful comparison of the Census and the Record Books, with the view of ensuring that every entry in the Census is represented by a corresponding detailed entry in the books. It will be some time before this task can be completed and the Census made ready for publication.

The Recorder has also devoted a considerable amount of attention to the work entrusted to him by the Council of the Society, of investigating and reporting upon the exact boundaries of the vice-counties where counties have been divided for the purpose of recording distribution. The work is now in active progress, and it is hoped to have a final report submitted before very long.

The Recorder feels justified in recommending that a sub-division of five vice-counties be made, viz : that, in accordance with a suggestion made by Mr. J. R. le B. Tomlin, the Scilly Isles be separated from Cornwall West, they being sufficiently remote from the mainland to render a separate record interesting ; also that Donegal be divided into East and West, Kerry into North and South, East Galway into North and South, and North Cork into North-east and North-west, in accordance with the practice of the Irish workers.

ANNUAL REPORT OF THE LEEDS BRANCH

FOR THE YEAR ENDING 30TH SEPT., 1912.

Eleven meetings have been held during the year ; the August meeting being cancelled owing to it clashing with holidays.

Five meetings have been held in the field, at the following places :—Heckmondwike, in April and May ; these two meetings were devoted to a thorough investigation of the habitat of a peculiar inflated form of *Limnæa pereger*. It is hoped by a series of observations to obtain all the possible information as to the vegetation, microscopic and otherwise, analysis and temperature of the water at various times, a microscopic examination of the zoological life present, etc., in an endeavour to find some satisfactory solution to the many morphological phases in the shell of this species. These experiments are to be continued in the future. The other meetings were held at Tanfield in June, York in July, and Grange-over-Sands in September. The September meeting was the sixth annual joint ramble with the members from Manchester, and was a most successful event.

The six indoor meetings, as during past years, have been held alternately in the University, Leeds, and the Cartwright Hall, Bradford, and have for their object special exhibits of British species. Mr. J. W. Taylor has continued his interesting accounts of the life-history, habits, and distribution of each species exhibited. The winter meetings are well attended, a tribute to the value of Mr. Taylor's papers. Other interesting exhibits are shown from time to time, in addition to the special one.

The meetings of the Yorkshire Naturalists' Union continue to be officially attended, of which Union, for this year, Mr. Taylor has the honour of being President. The membership at the present time is twenty-four, with three corresponding members. Mr. J. W. Carter, F.E.S., of Bradford, is President.

F. BOOTH, *Hon. Sec.*

ANNUAL REPORT OF THE LONDON BRANCH.

Since our last report eleven meetings of this Branch have been held.

The winter evening meetings (six in number) were well attended, and the exhibits in many instances were excellent: generally speaking, they were more numerous and of greater interest than during any past session.

In connection with these meetings, we are deeply indebted to Mr. J. C. Dacie for kindly placing a room at our disposal. As Canon Horsley accepted a country living last autumn, we were not only deprived of his genial company but also of the privilege of meeting at his house.

The field meetings this summer were disappointing. On three occasions the weather was distinctly bad. The attendance was small and very little collecting was accomplished.

J. E. COOPER, *Hon. Sec.*

416th Meeting, held at the Manchester Museum, Nov. 13th, 1912.

Mr. E. Collier in the chair.

Additions to the Library announced and thanks voted :

"Stephen Clessin : Nekrolog," by F. Borcharding. "The Terrestrial Mollusca of the Great Blasket and Beginish," by A. W. Stelfox. "Northern and Arctic Invertebrates in the collection of the Swedish State Museum : V. Prosobranchia : 1 Diotocardia," by Nils Odnher (from the respective authors). "Beitrage zur Meeresfauna der Insel Mauritius und der Seychellen ; Mollusken," by Prof. E. von Martens (from J. W. Taylor) ; and the usual periodicals received in exchange.

Donations to the Cabinet announced and thanks voted :

Voucher specimens, per the Hon. Recorder : *Helicella caperata* and *H. rufescens* from Currygrane, Co. Longford, from Mrs. A. Wilson ; *Hygromia rufescens*, Bambergh, from Mr. A. M. Oliver ; *H. rufescens*, Darlington, from Mr. B. R. Lucas.

By Mr. E. D. Marquand : *Vertigo substriata*, from Guernsey.

By Mr. R. Welch : A mounted series of *Helicella heripensis*, *H. caperata*, *Valvata cristata*, *V. macrostoma*, *V. piscinalis*, *Planorbis vorticulus* and *P. vortex*, from which the photograph was taken for the plate illustrating Mr. A. W. Stelfox's papers dealing with these species in Proc. Mal. Soc., vol. x., part I., March, 1912, p. 39.

Candidates Proposed for Membership.

Thomas Bonner-Chambers, Huccombe, Stockenham, Kingsbridge, S. Devon.
L. R. W. Loyd, 17, Sandringham Court, Maida Vale, W.

Member Deceased.

Robert Middleton.

A letter of condolence has been sent to the late member's family.

Papers Read.

"Further Notes on the Eucalodiidae," by G. C. Spence.

"Land Mollusca of Iona, N.B.," by J. F. Musham.

"Some Shells from the Rhone Valley," by B. R. Lucas.

"*Testacella scutulum*—another New Record for Staffordshire," by J. R. B. Masefield, M.A.

"*Helix cantiana* Mont., Eaten by Birds," by J. R. B. Masefield, M.A.

"*Vertigo antivertigo* in Staffordshire," by J. R. B. Masefield, M.A.

"*Cypræa caurica* var. *rosea* nov.," by J. Kidson Taylor.

"*Ancylus fluviatilis* var. *gibbosa* Bourg. in Derbyshire," by R. Standen.

"*Helicella itala* m. *sinistrorsum*," by Rev. C. E. Y. Kendall.

"*Vertigo substriata* in Guernsey," by E. D. Marquand.

"*Helix nemoralis* m. *sinistrorsum* in West Kent," by J. W. Jackson, F.G.S.

Exhibits.

By Rev. C. E. Y. Kendall : *Helicella itala* m. *sinistrorsum*, to illustrate his note.

By Mr. E. D. Marquand : *Vertigo substriata* from Guernsey, to illustrate his note.

By Mr. R. Welch : *Aporrhais pes-pellicani*, in very perfect condition, from a "shell-pocket" in the estuarine clay of Belfast Harbour, co. Antrim.

By Mr. R. Standen : *Ancylus fluviatilis* var. *gibbosa*, from Dove Dale, Derbyshire, to illustrate his paper.

By Mr. J. Kidson Taylor : An extensive series of locality forms and varieties of *Cypræa caurica*, to illustrate his paper.

By Mr. B. R. Lucas : A set of land and freshwater shells, from the delta of the Rhone, to illustrate his note.

By Mr. J. F. Musham : Photographs of Iona shells, to illustrate his paper.

By Mr. G. C. Spence : A series of species and varieties of *Acavus*, from Ceylon.

By Mr. J. Wilfrid Jackson : *Helix nemoralis* m. *sinistrorsum*, from Ballycastle, co. Antrim, and Otford, W. Kent, to illustrate his note ; *Helicella virgata*, Otford, Kent ; *Paludestrina jenkinsi*, near Shoreham, Kent ; *Planorbis vortex* (diameter 10 mm.), *Pl. spirorbis* (diameter 9 mm.), *Pl. contortus* (diameter 6 mm.), *Pl. umbilicatus*, *Pl. corneus* (white var. in pubescent stage), and *Bythinia tentaculata*, from drains near river Cam, at Cambridge.

By Mr. E. Collier : Two species of *Clausilia* from Tonkin—*Cl. proctostoma* Mabille, *Cl. arduiniana* Heud., with wide, broadly expanded mouths, and in shape very much like *Cl. philippiana* Pfr. from Burmah.

It was decided to have the following special exhibits at future meetings :

January 8—Lanistes and Marisa.

February 12—Trochatella and Eutrochatella.

March 12—Helix, section Tachea.

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PLATE I.

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Notice.—April Meeting.

At the invitation of the Manchester and District Members a joint Meeting with the Members of the Leeds Branch will be held at Manchester Museum, on Saturday, April 12th. The Afternoon Session will commence at 3 o'clock. Demonstrations by Mr. R. Standen and Mr. J. E. Crowther. This will take the place of the April Monthly Meeting.

THE

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APRIL, 1913.

No. 2.

ADDITIONS TO "BRITISH CONCHOLOGY."

By J. T. MARSHALL.

PART VII. (*continued from vol. 13, p. 338*).

P. angulata Jeff.—The animal of this species has hitherto been undescribed. The following description was taken from several specimens procured from fish stomachs, and necessarily in a more or less collapsed state—Body oblong, completely covering the shell; colour dirty white with a tinge of red; hinder part lobed; margin of mantle plain; gizzard very minute.

From low water of spring tides to 80 fathoms. Southport (Chaster)! Brora, from haddocks (Baillie)! off St. Martin's Point, Guernsey, 22f.; Scilly Isles 35f.; St. Ives and St. Mawes, Cornwall; Eddystone 30f.; Livermead, Torquay, a live specimen from weed; Tenby; off Southport 12f.; Skegness, Killala Bay, Portrush, off Loch Ryan 27f.; Mull of Cantire 40f.; Dornoch Frith; West Orkneys 45f.; East Shetland 8–10f.

var. **circumlustra** Marsh., *Journ. of Conch.*, 1893, vol. vii., p. 264.—Scilly, Eddystone, Tenby, Killala Bay, Portrush, Dornoch Frith, West Orkneys, 45f.

P. angulata would now appear from the above records to be generally diffused on our coasts, but it is everywhere rare, although my cabinet contains nearly 100 specimens. Mr. William Baillie, of Brora, writes me that he finds a specimen in almost every batch of haddock offal he examines, "generally associated with starfish remains," and that "it occurs on all the fishing-grounds frequented by the Brora and Golspie fishermen." It is possible that they are commensal or parasitic on starfish, either on the latter's body or on its rays, and are thus carried over the sea-bed and become a prey to the haddock. The lines of growth on the shell are rather conspicuous, and aged specimens become thickened by additional layers; they are otherwise very fragile and brittle, and the extended wing-like outer edge of the crown is rarely present in dead specimens. The young are smooth and glossy, and the apex is partially intorted, as in the next species.

The published figures are not good, nor correct. Jeffreys' is not square and open enough, the pillar is too large, the extremity of the outer lip is not sufficiently pointed, and it does not exhibit the conspicuous inner lip folded back on the pillar, as in Sowerby's; the latter is quite different from Jeffreys', and still further removed from the type; the spire, though pointed as in this figure, should be bent downward and not show above the crown.

Although *P. angulata* and various other species are recorded in these papers as derived from Sutherlandshire haddocks, it only means that the haddocks were caught in Sutherlandshire waters, but it will be obvious that the actual habitat of the molluscs is problematical. Mr. William Baillie of Brora, who died in 1906 in his 77th year, was an adept at the work of examining the offal of haddocks, and he found it a most fertile field. He was a superannuated schoolmaster, familiarly known in Sutherlandshire as "Teacher Baillie," and a good local naturalist somewhat after the manner of the well-known Thomas Edwards of Banff. It was his habit to go to the haddock-curers' sheds and bring away buckets full of fish offal. The examination of this was really a nauseous class of work, which would disgust most inquirers, but his repulsion was overpowered by his zeal for natural history, and he felt himself amply rewarded by the results.

P. quadrata S. Wood.—Doggerbank, Scarborough, Filey, and Whitby, occasionally cast ashore on the latter coasts; North Rona 45f., British Channel slope 690f. (Porcupine)! Forbes and Hanley give the best figures; the others are not sufficiently square, as if the artist had drawn the shell from his right-hand side instead of directly in front of him. A description of the animal has been left by Gwyn Jeffreys among his notes.¹

P. punctata Clark.—Low-water mark in places to 60 fathoms. St. Martin's Flats, Scilly, under stones at low water and dead in 30-40f. (Burkill and J. T. M.); Mayo and Sligo (Miss Warren)! Sutherlandshire (Baillie and J. T. M.); Tenby, Aberdovey, Portrush, Lamlash 12-18f., off Loch Ryan 27f., Iona 18f., Staffa 25f., Benbecula Sound 10f., Minch off Barra 53f., W. Orkneys 45f.

var. **cingulata** Marsh., *Journ. of Conch.*, 1893, vol. vii., p. 265.—Guernsey, Scilly, Land's End, Borough Island, Caldy Island, Tenby, Killala Bay, Portrush, Sutherlandshire, Benbecula Sound, Minch off Barra, and West Orkneys. Not the *P. cingulata* of Sars.

Like *P. catena*, this appears to have its home along the Cornish and South Devon coasts, but is sparingly though widely diffused elsewhere. The shell varies in the degree of attenuation of the crown, and occasionally the apical nipple appears above it. It differs

1 Moll. 'Porcupine' Exp., Proc. Malac. Soc., 1905, vol. vi., p. 325.

from *P. catena* in the top of the outer lip being a little below the spire, the mouth less patulous or more closed in; it is more tumid generally, and nevers grows so large; only rarely does it attain a line in length, though I have one from Guernsey a line and a half.

P. pruinosa Clark.—Guernsey 18f., one specimen; Borough Island, S. Devon; Caldy Island; Loch Linnhe 14f.; Dornoch Frith; E. Shetlands 8-10f. A scarce species. None of the British writers figure this truly, but Forbes and Hanley's is the best. Sars gives a very perfect figure.¹

P. nitida Jeff.—This species, like *P. angulata*, was almost unknown when "British Conchology" was published, and was recorded only from Skye and Unst. But although still rare, it will be seen from the following records that it is pretty generally diffused on our coasts:—Southport (Heathcote and Chaster)! Isle of Man (Liv. Mar. Bio. Assoc.)! Aberdeenshire (Simpson)! N. and W. Sutherlandshire (Baillie)! St. Magnus Bay 60-80f. (Jeffreys); S.W. Ireland 10-38f. (R.I.A. cruise); Penzance, Cawsand Bay, Eddystone 30f., Babba-combe Bay, Torbay, Pendine, off Southport 12f., Killala Bay, Portrush, Oban 20f., Dornoch Frith. Also British Channel slope 690f. and Adventure Bank 92f. ('Porcupine')! off Tunis 50-100f. (Newport)!

I have taken altogether about 70 specimens of this little shell from the above localities. It particularly affects a muddy habitat, and some of the above specimens were dredged almost in liquid mud. The young have a square outline and resemble *P. angulata* of the same size; but this is smooth and glossy, with a larger pillar. From a similar stage of *P. aperta*, which is also smooth and glossy, this is more square than round, it is much less open, and the outer edge does not extend beyond the crown.

P. aperta L.—From Jersey, where it is rare, to East Sutherlandshire.

var. **patula** Jeff.—Torbay, Weymouth Bay, W. Ireland, and Sutherlandshire. This variety has scarcely any pillar.

The shell is occasionally solidified by internal layers or pearly excrescences. Several specimens of a curious monstrosity dredged outside the Portland Breakwater has a nipple or spike projecting beyond the crown.

(To be continued).

NOTE ON *HELIX RUFESCENS* OF PENNANT.

BY E. A. SMITH, I.S.O.

From the *Annals and Magazine of Natural History*
(Ser. 8, Vol. xi., February, 1913).

THE object of the present note is to show that the shell universally regarded as the *Helix rufescens* of Pennant is not the form which was described and figured by that author.

The description appeared in the fourth volume of his 'British Zoology' (published in 1777) on page 134, and the figure of the specimen described is given on pl. lxxxv. fig. 127. His species is included in his second group, "Ventricose," and the description runs thus.

"Snail with four spires, and minutely umbilicated; the exterior spire sub-carinated. Of a pale brownish red mottled with white. Inhabits woods.

"*Tab. LXXXV. fig. 127.*"

It must also be observed that he referred to Lister's work of 1678, 'Hist. Anim. Angliæ,' quoting Lister's Latin diagnosis and referring to his figure.

Lister's shell¹ I believe, from his description, to be the *rufescens* of authors, and Pennant was wrong in supposing that it was the same species as that which he himself was describing as *Helix rufescens*.

The actual shell described by Pennant is now in the British Museum, and proves to be merely a young example of the common *Arianta arbustorum*.

Pennant, having quoted Lister's description and figure as representing his own species, it seems probable that subsequent authors adopted that conclusion without ever seeing Pennant's type, and consequently this wrong identification has been perpetuated.

Da Costa in 1778 was the first to adopt the Listerian shell as the *rufescens* of Pennant. He was followed by Donovan in 1802, Montagu in 1803, and by nearly all subsequent authors up to the present time.

Although it may seem to some inadvisable to alter a well-established name, it appears to me that in the present case there is no help for it. I might here observe that, in addition to the type of *Helix rufescens*, the Museum has recently acquired fourteen other types from the Pennant collection, besides sixty-one specimens which, although not types, are of historic interest, being the actual shells figured in Pennant's classic work.

¹ Lister referred to *cantiana* Montagu, as "vel varietas vel alia species."

Since Pennant's death his collection has remained at Downing Hall, Holywell, Flintshire, where he resided all his life, from 1726 to 1798. The property subsequently came into the possession of the Denbigh family, and it is the present Earl of Denbigh to whom the Museum is indebted for the specimens here referred to.

It now becomes necessary to determine what name must be assigned to the *Helix rufescens* of authors.

It certainly is the *Helix turturum* of Gmelin¹ in part, since he quotes the reference to Lister, but his other references to Schlotterbeck and Martini have nothing to do with the Listerian shell. In Gmelin's diagnosis the word *rotundata* occurs, which is applicable to the figures of Schlotterbeck and Martini, and even to that of Lister, which is drawn sinistral, and might be described as *rotundata*, for it resembles very little the shell (*rufescens*, auct.) which he evidently had before him.

Considering the confusion surrounding Gmelin's *Helix turturum*, I am inclined to disregard it entirely.

Helix circinata, *H. montana*, and *H. cælata*, described very briefly (but not figured) by Studer in 1820², are said to be the same as *rufescens*, auct., but from the very short descriptions they are certainly not identifiable. Subsequently, in 1828, Carl Pfeiffer united *montana* and *circinata*, and the shell he described and figured³ is evidently the same as the British species. I would, therefore, suggest that the shell in question should at present⁴ bear the name of *Hygromia montana* (Studer) Pfeiffer. *Helix striolata* C. Pfeiffer is apparently a synonym, and although the description of it appeared on p. 28, and that of *montana* on p. 33 of the same work, I prefer to suggest the adoption of the latter name, since it was proposed by Studer eight years before the appearance of Pfeiffer's book.

The *Helix corrugata* Hartmann with the varieties *clandestina*, *corrugata*, *cælata*, and *charpentieri*, described and figured in the 'Neue Alpina,' 1821, vol. i. p. 236, are not identifiable with certainty from Hartmann's description and the figure of the var. *cælata*, and therefore cannot be considered as antedating the *H. montana* properly established in 1828.

¹ Syst. Nat. p. 3639.

² Syst. Verzeich. Schweizer-Conch. p. 12.

³ Naturgesch. Land- und Süsswasser Moll. Abtheil. iii. p. 33, pl. vi. fig. 9 (fig 10 by mistake in text see p. 53).

⁴ Should *H. glabella* of Draparnaud eventually prove to be the same species, as is stated to be the case by some authors, that name should be retained instead of *montana*.

ON THE PENNANT COLLECTION OF BRITISH SHELLS.

BY EDGAR A. SMITH, I.S.O.

(Read before the Society, March 12th, 1913).

THE collections described and figured by Thomas Pennant in his work entitled "British Zoology" have recently been presented to the British Museum (Natural History) by the Earl of Denbigh, C.V.O.

This collection has, since Pennant's death in 1798, remained at Downing Hall, Holywell, Flintshire, where he resided all his life, and it does not appear to have been consulted by subsequent writers upon British shells. It is, therefore, very satisfactory, that, after lying more or less undisturbed for over a hundred years, the collection has now become National property.

Pennant does not definitely state whether the specimens described and figured were in his own or some other collection, but occasionally they are said to be from that of the Duchess of Portland. It is, therefore, possible that some of the shells described may have belonged to other collectors, although the fact is not stated, and hence they have not been found among the Pennant specimens.

The volume containing the mollusca was published in 1777. Some of the species are wrongly identified, and the majority of those described as new belong to well-known species founded by Linnæus, Müller, etc.

Of the shells received 18 are actual types of Pennant's new species and 64 are figured specimens.

The following list shows at a glance the species as given in Pennant's work, and the names by which they are now known:—

I. TYPES.

(PENNANT'S NOMENCLATURE.)	(MODERN NOMENCLATURE.)
1. <i>Helix rufescens</i>	= <i>Helicigona (Arianta) arbustorum</i> , juv.
2. <i>Helix hortensis</i>	= <i>Helix (Helicigona) aspersa</i> Müller.
3. <i>Helix nana</i>	= <i>Planorbis (Coretus) corneus</i> , juv.
4. <i>Turbo fasciatus</i>	= <i>Helicella (Cochlicella) barbara</i> (Linn.).
5. <i>Turbo tumidus</i>	= <i>Pomatias elegans</i> (Müll.).
6. <i>Turbo ulvæ</i>	= <i>Paludestrina ulvæ</i> (Pennant).
7. <i>Turbo tuberculatus</i>	= <i>Tympanotomus radula</i> (Linn.).
8. <i>Bulla cylindræa</i>	= <i>Bullinella cylindræa</i> (Pennant).
9. <i>Patella depressa</i>	= <i>Patella vulgata</i> Linn., var.
10. <i>Venus rhomboides</i>	= <i>Tapes virgineus</i> (Linn.)
11. <i>Venus ovata</i>	= <i>Venus ovata</i> Pennant.

- | | | | |
|-----|----------------------------|---|---|
| 12. | <i>Venus undata</i> | = | <i>Lucinopsis undata</i> (Pennant). |
| 13. | <i>Tellina crassa</i> | = | <i>Tellina crassa</i> Pennant. |
| 14. | <i>Solen pellucidus</i> | = | <i>Cultellus pellucidus</i> (Pennant). |
| 15. | <i>Mytilus pellucidus</i> | = | <i>Mytilus edulis</i> Linn., var. |
| 16. | <i>Mytilus umbilicatus</i> | = | <i>Modiolus modiolus</i> (Linn.), monstr. |
| 17. | <i>Pecten subrufus</i> | = | <i>P. (Æquipecten) opercularis</i> (Linn.). |
| 18. | <i>Pecten obsoletus</i> | = | <i>P. (Palliolum) tigrinus</i> (Müll.). |

It will be noticed that only six in the above list can be retained as valid species, the remaining twelve becoming mere synonyms of species previously described by Linnæus and Müller. One of them (*Turbo tuberculatus*) is not a British species, but belongs to a common West African form. The most interesting shell is the type of *Helix rufescens* which is merely a young example of *H. (Arianta) arbustorum* and shows that the *H. rufescens* has been wrongly identified by all authors since Pennant's time. A note upon this subject by the writer has appeared in the "Annals & Mag. Nat. Hist., 1913, vol. xi., pp. 263-4.

II. FIGURED SPECIMENS.

(PENNANT'S NOMENCLATURE.)

(MODERN NOMENCLATURE.)

- | | | | |
|-----|---|---|--|
| 1. | <i>Pholas crispata</i> Linn. | = | <i>Zirfæa crispata</i> |
| 2. | <i>Mya truncata</i> Linn. | = | <i>Mya truncata</i> |
| 3. | <i>Mya arenaria</i> Linn. | = | <i>Mya arenaria</i> |
| 4. | <i>Mya margaritifera</i> Linn. | = | <i>Margaritana margaritifera</i> |
| 5. | <i>Mya pictorum</i> Linn. | = | <i>Unio pictorum</i> |
| 6. | <i>Solen vagina</i> Linn. | = | <i>Solen vagina</i> |
| 7. | <i>Solen legumen</i> Linn. | = | <i>Pharus legumen</i> |
| 8. | <i>Solen cultellus</i> Penn. (non Linn.) | = | <i>Solecurtus antiquatus</i> Pult. |
| 9. | <i>Tellina cornea</i> Linn. | = | <i>Sphærium corneum</i> |
| 10. | <i>Cardium aculeatum</i> Linn. | = | <i>Cardium aculeatum</i> |
| 11. | <i>Cardium edule</i> Linn. | = | <i>Cardium edule</i> |
| 12. | <i>Cardium ciliare</i> | = | <i>Cardium aculeatum</i> , juv. |
| 13. | <i>Cardium lævigatum</i> Penn. (Linn.?) | = | <i>Cardium (Lævicardium) norvegicum</i> Spengler |
| 14. | <i>Macra solida</i> Linn. | = | <i>Spisula solida</i> |
| 15. | <i>Macra stultorum</i> Penn. (non Linn.) | = | <i>Spisula subtruncata</i> DaCosta |
| 16. | <i>Macra lutraria</i> Linn. | = | <i>Lutraria lutraria</i> |
| 17. | <i>Venus mercenaria</i> Penn. (non Linn.) | = | <i>Cyprina islandica</i> (Linn.) |
| 18. | <i>Venus erycina</i> Penn. (non Linn.) | = | <i>Venus verrucosa</i> (Linn.) |
| 19. | <i>Donax trunculus</i> Penn. (non Linn.) | = | <i>Donax vittatus</i> (Da Costa.) |

20. *Donax denticulata* Penn.
(non Linn.) = *Donax rugosus* (Linn.)
21. *Venus exoleta* Penn.
(non Linn.) = *Dosinia lincta* (Pulteney.)
22. *Venus litterata* Penn.
(non Linn.) = *Tapes pullastra* (Montagu.)
23. *Arca glycinimeris* Linn. = *Glycinimeris glycinimeris*
24. *Pecten maximus* Linn. = *Pecten maximus*
25. *Pecten jacobæus* Linn. = *Pecten jacobæus*
26. *Pecten varius* Linn. = *Pecten (Chlamys) varius*
27. *Mytilus modiolus* Linn. = *Modiolus modiolus*
28. *Mytilus edulis* Linn. = *Mytilus edulis*
29. *Mytilus cygneus* Linn. = *Anodonta cygnea*
30. *Cypræa pediculus* Penn.
(non Linn.) = *Trivia arctica* (Pulteney)
31. *Bulla lignaria* Linn. = *Scaphander lignarius*
32. *Voluta tornatilis* Linn. = *Actæon tornatilis*
33. *Buccinum pullus* Penn.
(non Linn.) = *Nassa antillarum* (Philippi.)
34. *Buccinum lapillus* Linn. = *Thais lapillus*
35. *Buccinum reticulatum*
Linn. = *Nassa reticulata*
36. *Strombus pes-pelecani*
Linn. = *Aporrhais pes-pelecani*
37. *Murex corneus* Penn.
(non Linn.) = *Tritonofusus gracilis* (Da Costa)
38. *Murex erinaceus* Linn. = *Ocinebra erinacea*
39. *Murex despectus* Penn.
(non Linn.) = *Neptunea antiqua* (Linn.)
40. *Turbo littoreus* Linn. = *Littorina littorea* var.
41. *Turbo duplicatus* Penn.
(non Linn.) = *Turritella torulosa* Kiener
42. *Turbo terebra* Penn.
(non Linn.) = *Turritella communis* Risso
43. *Turbo muscorum* Penn.
(non Linn.) = *Cochlicopa lubrica* (Müller)
44. *Trochus umbilicaris*
Penn. (non Linn.) = *Gibbula umbilicata* (Montagu)
45. *Trochus magnus* Linn. = *Gibbula magnus*
46. *Turbo clathrus* Linn. = { *Epitonium clathrus*, and
 Epitonium turtonis Turton
47. *Helix lapicida* Linn. = *Helicigona lapicida*
48. *Helix planorbis* Penn.
(Linn.?) = *Planorbis umbilicatus* Müll.

- | | | | |
|-----|--|---|---|
| 49. | <i>Helix cornea</i> Linn. | = | <i>Planorbis corneus</i> |
| 50. | <i>Helix arbustorum</i> Linn. | = | <i>Helicigona (Arianta) arbustorum</i> |
| 51. | <i>Helix vivipara</i> Linn. | = | <i>Vivipara vivipara</i> |
| 52. | <i>Helix zonaria</i> Penn.
(non Linn.) | = | <i>Helix (Euparypha) pisana</i> Müll. |
| 53. | <i>Helix</i> no name, pl. lxxxv.,
fig. at top | = | <i>Vivipara vivipara</i> juv. |
| 54. | <i>Helix auricularia</i> Linn. | = | <i>Limnæa auricularia</i> |
| 55. | <i>Helix stagnalis</i> Linn. | = | <i>Limnæa stagnalis</i> |
| 56. | <i>Helix putris</i> Penn.
(non Linn.) | = | <i>Limnæa palustris</i> (Müller) |
| 57. | <i>Helix tentaculata</i> Linn. | = | <i>Bithynia tentaculata</i> |
| 58. | <i>Nerita littoralis</i> Linn. | = | <i>Littorina littoralis</i> |
| 59. | <i>Nerita glaucina</i> Penn.
(non Linn.) | = | <i>Natica catena</i> (Da Costa) |
| 60. | <i>Nerita fluviatilis</i> Linn. | = | <i>Neritina (Theodoxia) fluviatilis</i> |
| 61. | <i>Patella pellucida</i> Linn. | = | <i>Patina pellucida</i> |
| 62. | <i>Patella vulgata</i> Linn. | = | <i>Patella vulgata</i> |
| 63. | <i>Patella hungarica</i> Linn. | = | <i>Capulus hungaricus</i> |
| 64. | <i>Dentalium entalis</i> Linn. | = | <i>Dentalium entalis</i> |

Twenty-two of these species are wrongly named, namely: —Nos. 8, 13, 15, 17, 18, 19, 20, 21, 22, 30, 33, 37, 39, 41, 42, 43, 44, 46 part, 48, 52, 56 and 59. Three of them, Nos. 33, 41 and 45 part, are not British species, and nine of the figured shells (Nos. 8, 17, 18, 30, 37, 42, 46 part, 52 and 59) although British, appear under names belonging to non-British species.

Many of these wrong identifications have already been noted by Forbes & Hanley, and Jeffreys in their works on British mollusca, but some are now indicated for the first time, and this has only been possible through an examination of the actual specimens referred to by Pennant.

***Helix nemoralis* m. *sinistrorsum* in West Kent.**—Whilst on a conchological excursion with Messrs. R. Welch and A. S. Kennard, to the valley of the Darent, on October 13th last, I had the good fortune to find a fine adult specimen of the above monstrosity, which, though dead, is in quite fresh condition. The specimen was obtained whilst searching a hedgerow in a lane leading into the Pilgrims' Way, between Otford and Kemsing. The other forms of mollusca noticed at this place were *Helix aspersa*, *Helicella virgata*, *H. caperata* var. *heripensis*, *H. cantiana*, *Hygromia hispida*, *Helicigona lapicida* and *Clausilia laminata*.— J. WILFRID JACKSON (Read before the Society, Nov. 13th, 1912).

DESCRIPTION OF A NEW SPECIES OF ADEORBIS.

BY J. R. LE B. TOMLIN, M.A.

(Read before the Society, March 12th, 1913).

Adeorbis platymma¹ n.sp. (pl. i., f. 12).

Shell much flattened, elliptical in shape, disk-like, acutely keeled, thin, white, with extremely fine, close and not very evident spiral sculpture; broadly and profoundly umbilicate; periphery simple; spire small, and but slightly projecting; whorls $4\frac{1}{2}$ in number, the last occupying most of the shell; aperture very large; columella very straight, forming a chord to the circular outline of the lip; base convex, marked with more or less concentric lines of growth which are much plainer in the young shell than in the adult.

Diam. max. 4 mm.; diam. min. 2.75 mm.

Alt. 1.25 mm.

Aperture—diam. max. 2.75 mm.; diam. min. 2 mm.

Hab.: Singapore (Archer).

Type in Brit. Mus. (Nat. Hist.).

In form this shell somewhat resembles *planulata*² Sow. from the Cape (described as a *Cyclostrema*) and *angasi*³ A.Ad., in fact Tryon⁴ records these Singapore shells as *angasi*. *A. platymma* is, however, easily distinguished by the absence of crenulation on the periphery. From *planulata* Sow. it differs by its shape, which is not circular, its convex base, by the absence of a raised line round the umbilicus, and by the character of the sculpture on the upper side, which consists of extremely fine and close lines.

¹ *πλάτυμμα*, a flat cake.

² Mar. Shells S. Afr., p. 46, pl. 2, f. 49.

³ P.Z.S., 1863, p. 424, pl. 37, figs: 11, 12.

⁴ Manual, vol. x, p. 86.

Clausilia rolphii (Leach) in Salop.—In May of this year (1912), while visiting Linley Woods in Salop with the British Mycological Society, I had the good fortune of finding a solitary specimen of *Clausilia rolphii* (Leach). *C. laminata* Mont. was plentiful in the same wood. *C. rolphii* has not previously been recorded from this county, and it seems likely that careful search would reveal its presence in parts of Worcestershire lying between Linley (which is not far from Bridgnorth), and its well-known stations in Gloucestershire. Mr. E. W. Swanton has kindly identified the shell for me.—N. G. HADDEN (*Read before the Society*, December 11th, 1912).

DESCRIPTIONS OF NEW SPECIES OF MARGINELLA AND MUCRONALIA FROM SÃO THOMÉ.

By J. R. LE B. TOMLIN and L. J. SHACKLEFORD.

(Read before the Society, March 12th, 1913).

*Marginella liparozona*¹ n.sp.

This name is proposed for the species figured by Reeve in the *Conch. Icon.*, pl. xix, fig. 93, as *M. festiva* Kiener. The latter, however, is a narrower, longer and more fusiform shell, which we figure from a S. Thomé example. Both species have three narrow red bands, the colour in fresh examples of *festiva* Kien. being rather deeper, but apparently more fugitive, and the figure we give was taken before a really fresh specimen came to hand (pl. i., f. 3, 4). The outer lip of *M. liparozona* has somewhat of a curve and the lower half of the aperture is much broader than in *festiva*. Between the red bands the pattern in both species is variable, but there always seems to be a well marked broader white band or area in *festiva* through which the central red band passes, whereas the longitudinal dark markings in *liparozona* usually come close up to the red. The confusion of these two species seems to have been general, at any rate since Reeve's time. To Kiener and Sowerby (who figures the real *festiva* in his *Thesaurus*) the locality of *festiva* was unknown, while Reeve gives the probably incorrect one of "East Africa" for *liparozona*. We can now record the occurrence of both these species at the Island of S. Thomé.

Type of *M. liparozona* in coll. Tomlin, as are also those of *M. eveleighi* T. & S. (pl. i., f. 5, 6), and *M. melvilli* T. & S. (pl. i., 1, 2).

*Mucronalia leucophaes*² n.sp. (pl. i., f. 7, 8).

Shell oblong-ovate, acuminate, imperforate, highly polished, of a shining vitreous white, so transparent that the whole length of the columella can be seen through the shell; whorls 9 (?), moderately convex; suture, rather slightly impressed; aperture small, subquadrate, two-fifths of the length of the shell; peristome simple, acute; columella slightly arcuate.

Long. 10 mm.; diam. max. 5.5 mm.

Aperture—diam. max. 4 mm.; diam. min. 3 mm.

Hab.: S. Thomé. Type in the Brit. Mus. (Nat. Hist.).

This shell bears a strong resemblance to *M. philippinarum*³ Sow. from Cebú. It is, however, broader in proportion to its length, the suture is much less impressed, the aperture is different in shape, and the shell has a thinner, more transparent texture. The apical whorls are unfortunately gone in the few examples so far received.

1 *Λιπαρόδωρος*, bright-girdled. 2 *Λευκοφαής*, white-gleaming. 3 *Pro. Mal. Soc.*, iv. p. 127, pl. 11.

NOTES ON SOME TYPES OF MARGINELLA IN THE MARRAT COLLECTION.

BY J. R. LE B. TOMLIN, M.A.

(Read before the Society, March 12th, 1913).

By the courtesy of Mr. J. A. Clubb, the Curator, I have recently received from the Liverpool Free Public Museum certain species of *Marginella* for examination. I have taken the opportunity of figuring several practically unknown species which were briefly described in the first volume of this *Journal*. The following notes are the result of my examination.

Marginella pellicula Weinkauff.—This Cape species has generally been credited to Marrat and specimens in his collection are so labelled, but without locality. I cannot, however, ascertain that Marrat ever described it, and Weinkauff,¹ the first monographer to include it and figure it says: "*M. pellicula* Marrat, teste Sowerby in litt.," so it is most probably only a MS. name. Fortunately the point is of small importance as Weinkauff² is certainly right in his subsequent surmise that it is a synonym of *lucida*³ Marrat. The description of the latter is unmistakable, and the shells distributed as *pellicula* are merely worn, bleached *lucida*. The Curator has failed to find the types of *lucida* in the Marrat Collection.

M. ovuloidea Marrat.—Purely a MS. name. The two examples are immature and much worn *M. maculosa* Kien.

M. warrenii⁴ Marrat.—This splendid species is described as having been collected by a Capt. Warren in lat. 50° 23' 5" N., long. 64° 0' 4" W., a locality somewhat inland from the northern coast of the Gulf of St. Lawrence! One of the specimens measures 23 mm. I have selected for figuring the only one which exactly coincides with Marrat's measurements, and which is presumably the type (pl. i., f. 9). The aperture measures 15 mm. in length. The two bands have apparently faded as they are now of a very pale, dirty yellow. It is impossible to conjecture the real origin of this species; it is so different from any other known species. I am inclined to think that it has affinities with the W. Indian *avena* group.

M. praecallosa⁵ Higgins.—The unique specimen of this species (pl. i., f. 10) from an unknown locality has an unusually thick outer

¹ Küster, Conch. Cab. Marg., p. 123 (1879).

² *Ibid.*, p. 137.

³ *J. of C.*, i., p. 205 (1877).

⁴ *J. of C.*, i., p. 137.

⁵ *J. of C.*, i., p. 136.

lip, as its name is intended to point out. I have no hesitation, however, in calling it a somewhat abnormally callused *M. undulata* Ch. The lower of the two bands referred to in the original description is of the faintest. The upper band is more or less interrupted after the usual fashion in *undulata*. The abnormal thickening of the outer lip has lengthened out the usual internal denticulation till it forms a series of what Higgins calls sinuous plications.

M. callosa¹ Marrat (1876)=**M. carneola** Petit (1851).

M. nana² Marrat (pl. i., f. 13).—This is a very pretty and distinct little species of which there are several examples. It has narrow but well marked red lines on a shining yellowish white ground, and ought really to be called quadrifasciate as there is a fourth very short linear band which only shows round the columellar callus. The suture is also marked by a red line, and there is a well marked red spot at the top and bottom of the aperture.

M. davisiana³ Marrat (pl. i., f. 11)=**M. bellii** Sow.—I fail to see how Marrat could describe the longitudinal lines as distant. There are about 35 on the body whorl. The locality is Cape Blanco. The locality of *M. bellii*, when described, was unknown. *M. bellii* has priority.

M. tyermani⁴ Marrat.—The type specimen is rather worn and has an unusually thickened outer lip, a feature which always seems to emphasize the internal denticulation. The other specimen, which Marrat calls the variety, has *not* got the lip smooth inside but plainly denticulate, and is a nice fresh normal specimen which, though smaller, would have been far more suitable for the type. I am not figuring this as it is well represented in Proc. Malac. Soc., vi., pl. 17, fig. 3—the figure of *M. keppeli* Sykes, which is the same species. It has recently been dredged off Cotonou and Libreville, on the West African coast, in 13½f. *M. tyermani* has priority.

1 Ibid., p. 137.

2 Ibid., p. 205.

3 Ibid., p. 205.

4 Ibid., p. 136.

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Correction.—A correction in the nomenclature of the Lapp shells mentioned in vol. 13, p. 358 of this *Journal*, seems to be necessary. Instead of *Planorbis albus* var. *draparnaldi* Beck, and *P. rossmaessleri* Auersw., read for both *Planorbis borealis* Lovén. I have to thank Mr. A. S. Kennard for this identification. I had previously remarked on the extreme likeness in these two sets, but was unable to do anything at the time I wrote the paper.—J. D. DEAN.

THE SENSE—AND NONSENSE—OF THE NAMES OF THE BRITISH LAND AND FRESHWATER SHELLS.

(Presidential Address delivered at the Annual Meeting, Oct. 12, 1912).

(Concluded from p. 22)

BY THE REV. CANON J. W. HORSLEY, M.A.

The species *revelata* = discovered ! *rufescens* is reddish.

The genus *Acanthinula*, the "small thorny one," contains *lamellata*, i.e., having plates, the epidermis being raised into ridges ; and *aculeata* i.e., spiny, in which the ridges are produced into spines.

The genus *Vallonia*, perhaps after Vallonia, the goddess of valleys, contains *pulchella*, i.e., small and beautiful ; *costata*, i.e., ribbed ; and *excentrica*, in which the whorls are not concentric round the umbilicus.

The genus *Helicodonta* (toothed snail) contains with us only *obvoluta*. The word means wrapped up.

Helicigona, i.e., the *Helix* with angles, is represented only by *lapicida* i.e., the stone cutter. Its var. *subangulata* means with a somewhat sharp angle. Mr. Knight thinks that *Arianta* may be named from Ariantas, a Scythian king, mentioned by Herodotus. It contains only *arbustorum*, i.e., frequenting shrubberies or copses. The var. *canigonensis* is named from having been noticed first at Mt. Canigou in Spain. The var. *cincta* is also called *pallida* by Taylor, the former name denoting that it has a peripheral band, the latter that its colour is pale yellow. Var. *flavescens*—somewhat yellow.

The genus *Helix* (the old Greek word for a coil) is divided now into several sections of which *Helicogona*, *Cefæa*, and *Euparypha* are alone known to Britain. The first name denotes "of the same race as *Helix*" ; the second, I presume, is derived from the Greek *κηπέω*, "to rear in a garden" ; and the third comes from the Greek for having a handsome border, an allusion I suppose to its definite white lip. *Aspersa* means besprinkled. Var. *tenuior*, i.e., thinner, has a much thinner shell than usual, probably only a matter of diet. Var. *exalbida*, not "very white" (some nomenclators think the prefix *ex* denotes excessive) but becoming white (by loss of pigment). The name *quinquefasciata* of Requier, the Corsican conchologist, is better and the equivalent of the var. *zonata* in our list, which has five separated dark bands on a yellowish ground. Var. *flammea*, i.e., flame-shaped, has the bands broken transversely. Var. *unicolor*, i.e., of one colour, which is fawn. Var. *undulata*, i.e., undulating—marked with oblique dark streaks across the whorls.

H. pomatia is named from the Greek πῶμα, an operculum, and not from the Latin *pomum*, an apple. *Nemoralis*, i.e., inhabiting woods. *Compressa*, i.e., with depressed spire; *ponderosa*, shell more ponderous and thick, up to thirty grains as against an average of ten; *bimarginata*, i.e., double margined, when the dark peristome is bordered within by a white rib; *rubella* in somewhat late Latin means reddish. Var. *libellula*. The word is unknown to classical Latin. There is indeed *libella*, which means an *as*. In the Latin of Natural History, however, *libellula* appears, and means a dragon-fly. Var. *castanea* = chestnut coloured. Var. *olivacea* = olive brown. Var. *albolabiata* = with a white peristome.

C. hortensis, i.e., the garden snail. As to var. *incarnata*, to classical Latin this word is unknown. In mediæval Latin it would, of course, be common from theology, as meaning 'having become flesh.' What was running in the namer's mind was apparently the idea of flesh-coloured. Var. *arenicola*, i.e., the denizen of the sands.

Euparypha contains only *pisana*, i.e., collected near Pisa in Italy. So named in 1711 by Petiver, an Aldersgate apothecary, who bequeathed his collections to Sir Henry Sloane, the founder of the British Museum.

We come next to the family of *Enidæ*. The species *montana* I have found in the Swiss mountains on or under trees, but as found in our south and west countries it does not justify its name. The other species *obscura* was so named from its habit of covering itself with earth, or other substances, by way of protection.

The family of *Stenogyridæ* = narrow whorled.

The genus *Cochlicopa* (named from κοχλίας, a spiral shell, and κόπτω, to cut, as having a notch in the lip) gives us *lubrica*, i.e., slippery. Var. *morseana* commemorates Prof. Morse, who established the *American Naturalist* in 1862. Var. *exigua*, i.e., smaller than the type. Var. *hyalina*, of Jeffreys, should mean glassy. The Rev. G. A. F. Knight (*J. of C.*, vol. ix, p. 275) suggests that *Azeca* is named from a town of the tribe of Judah. The only species is *tridens*, although the number of denticles is not always three. Var. *nouletiana*, named after the director of the Nat. Hist. Museum at Toulouse (died 1890), has only one, and var. *alzenensis* has five.

The next genus is *Cæcilioides*. If this word is supposed to be Latin it would mean either like to a blindworm or like to a lettuce. *Cæcus*, however, being Latin for blind, the allusion, no doubt, is to the fact that this subterranean species is eyeless. The specific name *acicula* means a hair-pin.

The name *Jaminia* is said by Dupuy to be derived from the Greek

word *ἡμενὴ*, a moist place. But there is no such word. There is, however, *εἰαμενὴ*, a riverside pasture.

Abida was a son of Midian, mentioned in Genesis and I. Chronicles. The species *secale* is named from the Latin for rye, a grain which the shell more or less resembles.

In the sub-genus *Lauria* was a typical species found in the laurel zone in Madeira or Teneriffe by Wollaston? It has the species *anglica*, so named by Férussac. The other species is *cylindracea*, though most *Pupæ* are cylindrical. The var. *curta* is named from being shorter, and var. *gracilis* from being more slender.

The sub-genus *Jaminia* contains *muscorum*, "inhabiting moss." The var. *bigranata* has two denticles and var. *brevis* is short.

The genus *Vertigo* was so named from *vertigo* a turning round or twist, the Latin equivalent of the Greek *Helix*.

Isthmia probably commemorates the Isthmian games at Corinth. Dupuy derives *Alæa* from *ἄλαιος*, blind, but this word is *ἀλαός*, which would not make *Alæa*. And is the animal blind? Lemprière gives "Alæa, a surname (sic) of Minerva in the Peloponnesus." Mr. Ponsonby sends me the ingenious suggestion that the name is derived from the *ἄ* negative and *λαιός* left, as most species in this section are not sinistral.

Antivertigo = with a reversed twist. *Substriata*, i.e., slightly striated. Var. *quadridentata*, with four denticles. *Moulinsiana*, named after Des Moulins, an excellent French conchologist. *Alpestris*, i.e., inhabiting high places. *Pusilla* = minute, a diminutive from the rare *pusus*, "a little boy."

Vertilla, i.e., small and twisted. *Angustior* = narrower. Possibly the name refers to the mouth being more contracted than that of *V. pusilla*, of which it was sometimes thought to be the young.

Next comes the family of *Clausiliidæ*, the name derived from *clausilium*, a little door, i.e., possessing a contrivance (not an operculum) to close the mouth. The difficulty of finding the meaning or derivation of the names given by some naturalists is well illustrated by *Balea*. Dr. Gray is responsible for it, but deigns no interpretation in his edition of Turton, while in a later work he writes *Balæa*. Jeffreys suggests that *Balea* is a printer's (or author's) error for *badia*, i.e., bay - coloured. M. Bourguignat thought it came from *βαλιός*, spotted, but Jeffreys rejects this "as the shell is not spotted." True, but he goes on in his description of the animal to say "body—dark-brown with a shade of grey, covered with minute black tubercles and specks." In this case it should be *Balia* and not *Balea* or *Balæa*. Very far-fetched is D'Orbigny's derivation from an obsolete Latin word *balea*, signifying a boat or vessel. The sole species *perversa* is

turned the wrong way, i.e., sinistral. It has a var. *simplex*, i.e., without denticle.

In the genus *Clausilia*, Marpessa is a faithful matron mentioned in Homer. *Pirostoma* is formed from the Latin for pear and the Greek for mouth; *laminata* is so named from having three or four laminæ or plates, visible through the shell. *Biplicata* is named from having two folds. The var. *nelsoni* was named by Jeffreys in honour of Nelson, one of the founders of our Society. *Bidentata*, i.e., with two teeth. Var. *cravenensis*, first described from Craven in Yorkshire. Var. *everetti*, named by Miller after an English conchologist, who travelled in Borneo and the east generally. *P. rolfhii*, named by Gray after Rolfh, a contemporary English conchologist.

The *Succineidæ* are represented only by *Succinea*, i.e., amber-coloured, from *succinum*, amber. *S. putris*, i.e., stinking, is a somewhat libellous term given it by Linné. Var. *stagnalis*, i.e., inhabiting marshes. Var. *solidula*, i.e., somewhat solid, or thicker in shell. *S. elegans*, elegant in form. Var. *longiscata*, i.e., lengthened, from a late Latin inceptive verb *longisco*, to become long. Var. *pfeifferi*, named after Pfeiffer, the great German conchologist. Var. *ochracea*, i.e., yellow. Not a pure Latin word, but formed from *ochra*, our ochre. *S. oblonga*, having a longer spire in proportion to its size. Var. *arenaria*, named by Bouchard from being often found on sand-hills near the sea.

We come now to the *Basommatophora*, which have the organ of vision at the base of the tentacles.

The first family is that of the *Auriculidæ*, so named from the mouth being more or less ear-shaped. The genus *Carychium* Gray and Turton call the minute sedge shell, as if the name was derived from *Carex*, sedge, which can hardly be, as the 'y' suggests a Greek origin. Jeffreys says it is named "from its resemblance to a Murex or kind of whelk"—which is vague. Dupuy gives three Greek words as its possible origin, none of them applicable according to sense, and all of them inapplicable as beginning with a χ and not a κ , and so the word would be *Charychium* and not *Carychium*. Its specific name is *minimum*, i.e., smallest. The genus *Phytia* is, probably the Greek $\phiύτιος$, meaning generative. *Ph. myosotis* was named from its mouth being like a mouse's ear. *Ovatella* may mean the small egg-shaped shell.

The next family is *Limnæidæ*, i.e., living in stagnant water, from the Greek λίμνη, a lake, although by no means unknown in rivers.

The first of its genera is *Ancylus*, from its recurved form at the apex—the Greek ἀγκύλος, hooked. *Fluviatilis*, i.e., inhabiting rivers, rarely in still water. Var. *capuloides*, a mongrel word for like a

handle, from the Latin *capulus*. Var. *gibbosa* is more swollen in appearance, and var. *stricta* has the sides more compressed or restricted.

The next genus *Acroloxus* (from two Greek words which, in combination, mean slanting at the top) has the species *lacustris* inhabiting lakes. Its var. *moquiniana* was so named by Bourguignat, after the great French conchologist, Moquin-Tandon.

In the genus *Limnæa* the species *auricularia* is named from the supposed likeness of its large mouth, with widely reflected outer lip, to the human ear. The var. *reflexa* has the outer lip more reflected than usual. The species *pereger*, i.e., wandering, a good name for a shell found practically over the whole of the Eastern Hemisphere; or it may be named from its almost amphibious habits. Var. *obtusa*, blunt. *Stagnaliformis* is like *Limnæa stagnalis* in shape. *Vulgaris* is a name that should be given, if at all, to the type. *Maritima*=found near the sea. *Microstoma*, i.e., small mouth. *Diaphana*, i.e., transparent, from the thinness of the shell. *Picta*, painted, i.e., marked spirally by alternate bands of brown and white. *Labiosa*, i.e., with a large lip, expanded and reflected, so as to resemble *auricularia*. *Burnetti* is named after its discoverer, a Newcastle naturalist. *Involuta* is supposed to convey the information that the spire is enveloped by whorls. The species *palustris* (marsh-inhabiting) has the vars. *corva*, i.e., a crow (not that *corvus* has a female form), from its dark purple colour; *obesa*, i.e., fat; *tincta*, i.e., dyed, from the mouth being purplish; *lacunosa*, i.e., with flattenings, depressions, and protuberances, making *lacunæ* or gaps in the surface.

L. truncatula, i.e., somewhat truncated. Var. *ventricosa*, from *ventrum*, a belly, having the whorls tumid.

L. stagnalis, i.e., inhabiting swamps. Var. *variegata*, i.e., with whorls variegated with white growth markings. *Leptolimnæa* is named from λεπτός trim. *Glabra*, i.e., smooth. *Amphipeplea*, i.e., covered with a mantle—when young. *Glutinosa* indicates that to the touch it is glutinous from the expansion of the mantle over the shell. Var. *mucronata*, i.e., pointed like a sword.

Planorbis is a coined compound, a non-classical word, meaning a flat coil. Its species *corneus* is horn-coloured. *Gyraulus* is from the Greek words for round and a tube. Its species *albus* has the var. *sulcata*, i.e., furrowed; *crista* has the ridges of the epidermis exaggerated into crests, while the var. *levigata* (which should be spelled with an *e* not an *æ*) is smoothed, i.e. without ridges; *dilatatus*, i.e., expanded (as to its mouth). *Carinatus*, i.e. keeled, with its var. *disciformis*, i.e. disk-like, which is flatter; *umbilicatus*, i.e., with an umbilicus; *rhombea*, i.e. four-sided, refers to the appearance of a section of the

last whorl; *vortex*, i.e. a whirlpool, from the appearance of the very flat whorls; *spirorbis*, i.e. circular coil. Its var. *ecarinata* has not the faint keel of the type. Section *Bathyomphalus*—deep umbilicus—contains only *contortus*, i.e. twisted up. *Hippeutis* is a Greek word and means a horseman and the connection of ideas is not patent. Its species *fontanus* bears a name indicating its love of springs—and watercress beds. *Segmentina* was named from the nautilus-like *septa* or divisions which are visible through the shell.

The name *Physa* means in Greek a pair of bellows, or a blast from the bellows. *Aplecta* seems to be the Greek for unplaited. Its specific name *hypnorum* means inhabiting the moss *Hypnum*, which is terrestrial.

Now we come to the *Prosobranchia*, meaning that the branchiæ, or breathing apparatus, are in front of the heart. The first family is *Paludestrinidæ*, the marsh living shells. The species *jenkinsi* was named after Mr. Jenkins, a working upholsterer at Greenwich, with whom I sought and studied it in the Plumstead marshes in 1889. Var. *carinata* has a marked keel in the centre of the whorls, but few seem to have noticed that sometimes the keel bears bunches of spines at equal distances. *Ventrosa*, i.e. with a belly. *Taylori* is the species differentiated by Mr. F. Taylor. *Stagnalis* has a variety *barleei* named by Jeffreys after his friend Mr. Barlee, a west country conchologist, and another var. *octona*, so named from its having eight whorls. The genus *Pseudamnicola* meaning False Amnicola. *Anatina* means belonging to ducks.

Bithynia, *Bithinia* (Gray), *Bythinia* (Jeffreys)—which is the right spelling? If *Bythinia*, the author meant to derive it from a Greek word denoting deep water—which it does not inhabit. But there is little doubt that Leach named it after the province in Asia Minor. The specific name *tentaculata* means having tentacles. Its var. *producta* is more produced and the var. *excavata* has a deeper suture. The other species *leachi* was named by Sheppard after Dr. Leach.

The family *Viviparidæ*, i.e. producing young alive. The var. *efasciata* has no bands and was named *unicolor* by Jeffreys. *Contecta*, i.e., mouth covered with an operculum.

The family *Valvatidæ* was so named from the possession of a valve or operculum. *Valvata piscinalis* gets its specific name from inhabiting fish-ponds. Why *antiqua* or ancient was considered a good name for a variety by Sowerby I cannot find, possibly as found in Holocene deposits. The other species *cristata* is so called from its having a branchial plume like the crest of a helmet.

The family *Assemaniidæ*—Jeffreys calls *Assimineæ* “a ridiculous name” and adds “the author ought to have borne in mind one of

Linné's laws of scientific nomenclature—"Idiotæ imposuere nomina absurda." The Rev. Frank Knight, however, suggests very plausibly that Leach called it after a great oriental scholar the Abbé Simon Assemani, who died in 1821 at Padua, Leach being in North Italy in the same year—contains but the one estuarine species *grayana*, so named by Leach in honour of Dr. Gray, of the British Museum.

The family *Pomatiidæ* has in England but one species, better known as *Cyclostoma*. The name is derived from the Greek *πῶμα*, a cover, i.e. here an operculum. Its var. *marmorea* has marble-like markings and is free from striation; its var. *ochroleuca* is whitish-yellow.

The family *Aciculidæ* (*acicula* a hair pin—the primæval straight and white bone pin being in mind) contains only the very minute *A. lineata*, lined or striated in the line of growth.

The family of *Neritidæ* has with us but one genus *Neritina* and one section of that genus, *Theodoxia*, and one species, *fluviatilis*. *Nerita* is the name given by Pliny to a sea-shell, which Smith's Latin Dictionary describes as "a sea-muscle (*sic*) resembling the nautilus"! The word is originally Greek and probably derived from Nereus, the sea-god. Its var. *cerina* is named from *cerum* wax, as being yellow.

Passing now to bivalves or *Pelecypoda* (axe-footed, from the supposed resemblance of the protruded foot to an axe) the group to which all our British species belong is that of the *Eulamelibranchiata*, i.e. having well laminated branchiæ or gill plates. Our fluviatile bivalves also belong to the division *Submytilacæ* or connections of the *Mytilus* or mussel.

The name of the genus *Dreissensia* was originally *Dreissena*. The origin of the name is the commemoration of M. Dreissens, a druggist of Mazeyth, a place in Holland. Our only species is called *polymorpha* or many shaped. It has a var. *angusta* (narrow) and a var. *dilatata* (broadened) and these practically comprise all the variations of form.

The family *Unionidæ* derives its name from *Unio*, a pearl, because British pearls have for ages been chiefly obtained from a *Unio*. The species *pictorum*, "the painter's mussel" (or, as in Gray's Turton "the thin painter's *Union*") is so named because sometimes gold and silver paint was sold in the shells for illuminating work. It has a var. *curvirostris*, i.e. with curved beaks; another *laticor*, i.e. broader than usual; another *radiata*, i.e. with yellow and green radiations; and another *platyrhynchoidea*, i.e. in form like *Unio platyrhynchus* (broad nosed) of Rossmässler found in S.W. Austria. *Unio tumidus* (swollen) is broader and thicker than the preceding species. Its var. *mülleri*, named after the Danish naturalist of the eighteenth century, is more

oval. Var. *ponderosa* is heavier from the solidity of its shell. *Margaritana* from the Greek for a pearl. The species *margaritifera* = pearl-bearing. Its var. *sinuata*, i.e. curved, has the lower margin of the shell incurved.

The genus *Anodonta* is named from the absence of lateral teeth at the hinges. *A. cygnæa* and *A. anatina* were so named by Linné as eaten by swans and eaten by ducks respectively. Schröter's variety *arenaria* probably means "found on a sandy bottom." Var. *rostrata* = beaked; var. *incrassata* = thickened.

The genus *Sphærium* (α not ϵ) is so called from the spherical or rounded character of the shell. *S. corneum* var. *nucleus* is especially suggestive of a ball. Gray's var. *pisidioides* gets its name from being somewhat triangular like the *Pisidia*. *Rivicola* = inhabiting rivers. *Corneum* = horny in colour. *Lacustre* has a var. *ryckholti*, named after Baron P. de Ryckholt. The type is round, but var. *rotunda* is more round, and var. *ovalis* more oval than the type. *Pallidum* is pale grey.

The genus *Pisidium* was named from its likeness to a pea, *pisum* in Latin. The species *annicum* is named from its inhabiting rivers. The var. *læviuscula* is, I presume, bad Latin and bad spelling for levior, i.e. smoother, the striæ being faint. *Henslowanum* was named by Sheppard in honour of Prof. J. S. Henslow, of Cambridge (1796-1861); *subtruncatum*, somewhat truncated; *pulchellum* is glossy and therefore perhaps more worthy of its name "pretty little one"; *pusillum*, i.e. small; *nitidum*, i.e. shiny, is the most glossy of its congeners; *obtusale*, i.e. blunt; *gassiesianum* was named after M. Gassies, a contemporary French conchologist who collected chiefly in New Caledonia.

NOTE.—I find that I was misled as to the quantity of the *i* in *Arion* (see p. 19, line 27), and that it is long after all.

***Helicella virgata* at Lowestoft.**—On the 21st January of this year this species was crawling freely on a sloping bank of the south promenade at Lowestoft. Quite twenty-five per cent. were of the varieties *alba* and *hyalozonaia*, a larger proportion than I have seen anywhere else, except near Dublin.—W. GYNGELL (*Read before the Society*, Sept. 11th, 1912).

THE NON-MARINE MOLLUSCA OF ICELAND.

By F. H. SIKES, M.A., F.L.S.

(Read before the Society, Jan. 8th, 1913).

THE authorities on this subject are Westerlund (Synopsis Mollusc. Extramarin. Scand., 1897) and Mörch (Faunula Mollusc. Islandiæ, 1868), from which it would appear that there has not been any recent investigation, inasmuch as the excellent Museum at Reykjavik contains only seven or eight species.

Dr. Mörch, whose list is almost identical with Westerlund's, certainly gathered together a considerable number of records, when one takes into account the barrenness of the land, and though, in a recent visit, I almost literally left no stone unturned, I can only supplement his list by three species. As they are all *Pisidia*, it is probable that even one or two of these were found by Mörch and wrongly identified, a lot of water having flowed under the Pisidian bridge since 1869.

In my eleven days' voyage I practically circumnavigated the island, and called in at ten fjörds, afterwards spending a fortnight in the interior. It seemed to me a curious fact that such results as I got are almost entirely due to prospecting in the north, as at Reykjavik, and from there up to the geysers, viâ Thingvellir, nothing except a *Vitrina* of the land molluscs turned up. At Hafnarfjördr, however, which is six miles from the capital, I found among the lava crevices *Arion ater* and *subfuscus*, and *Hyalinia alliaria* in some quantity. *Helix aspersa* seems to be non-existent; all my solicitous enquiries after it only led me into wild goose chases (if one can use this expression about a country where these birds are plentiful) and consequent 'bagging' of *A. ater*, which was the nearest that my informants could get to my description of *aspersa*.

I was interested to find that *Helix hortensis*, which has long been of rather doubtful authenticity, is not only confirmed by a mouse-nibbled specimen I got at Seydisfjördr, but also by a var. *kleinia* taken by Mr. B. Samundsson in 1896 at Drangshéd.

Though one quarter as large again as Ireland, one-eighth of Iceland is under lava and one-ninth covered with glacier. When one adds to this the precipitous mountains in the proportion of 15 to 1 of level ground, it will be seen that it is not a very likely recruiting ground for land and freshwater mollusca.

According to the learned geologist, Dr. Pjeturrs, of Reykjavik, Iceland is a tableland built up of basalts with intercalated beds of sedimentary rock. The thickness is estimated at 12,000 to 14,000 ft.,

and about one-third of this consists of shale and lignite, together with indurated moraines, claystones with glacial and interglacial shells, and fluviatile and lacustrine conglomerates. There are many remains of pleistocene volcanoes, while the oldest basalts are probably oligocene. Throughout the island are innumerable hot springs (Laugar) and in the best known ones near Reykjavik I found *Limnæa peregere* var. *geisericola* Beck, living in water so hot that I could only just bear to put my hand in it, and at a distance of about forty feet from the source, where the water bubbles out of the ground at a temperature of 250° Fahr. To excuse the apparent unscientific treatment of this phenomenon I must plead in defence that I took a thermometer down with me which shivered into atoms in the hottest water. Alas! for it was borrowed. As there are now three lists of Icelandic shells, I have thought that a better 'conspectus' would be gained by putting the results in parallel columns; the "ditto," of course, must be treated horizontally. I owe many sincere thanks to Mr. A. S. Kennard, who, with Mr. Woodward (*Pisidia*), and Mr. Roebuck (slugs), has verified or altered my conclusions.

N.B. —=not found. Do.=found.

MÖRCH, 1868.	WESTERLUND, 1897.	SIKES, 1912.
<i>Arion ater</i> (L.).	do.	do. var. <i>atra</i> Hafnarfjördr (S.).
—	<i>Arion rufus</i> =var. <i>rufa</i>	—
<i>Arion cinctus</i> Müll.	—	<i>Arion subfuscus</i> (Drap.)
—	—	var. <i>aurantiaca</i> Loc. Reykjavik (S.)
—	—	var. <i>fuliginea</i> Morelet Hafnarfjördr.
<i>Arion hortensis</i> Fér.	—	—
<i>Limax agrestis</i> (L.).	—	<i>Agriolimax agrestis</i> Reykjavik.
—	—	var. <i>reticulata</i> Moq.-Tand.
<i>Limax marginatus</i> (Müll.).	do.	—
<i>Vitrina beryllina</i> Pfr.	—	—
—	<i>Vitrina angelica</i> Beck.	do. common.
<i>Hyalinia alliaria</i> Müll.	do.	do. Hafnarfjördr, Isafjördr (N.W.)
<i>Hy. hammonis</i> = <i>radiatula</i> (Alder)	do.	do. Akureyri (N.)
—	<i>Conulus fabricii</i> (Müll.)	do. Isafjördr, Seydisfjördr (N.E.).

Conulus trochiformis

Mtg.

Conulus fulvus (Müll.).*Arianta arbustorum* (L.)

do.

do. Seydisfjördr, Nord-
fjördr (E.).

—

—

var. *alpestris**Helix hortensis* Müll.

do.

do. Nordfjördr.

—

Helix hispida (L.).

—

Cochlicopa lubrica

(Müll.).

do.

do. Akureyri.

Pupa arctica (Wall).

—

Vertigo arctica Isa-
fjördr.

—

Pupa muscorum (L.).

—

Succinea grænlandica

Beck.

do.

do. common.

—

S. altaica West.

—

Limnæa truncatula

(Müll.).

do.

do. Akureyri and
geysirs.*Limnæa vulgaris* C. Pfr.

—

—

Limnæa geisericola

Beck.

L. pereger var. *geiseri-*
cola.do. Reykjavik, hot
springs.

—

Limnæa ovata Drap.*L. pereger* var. *ovata*.

—

do. var. *steenstrupi*

do. Laugarvatn.

Cless.

—

—

var. *fontinalis* Stud.
Laugarvatn.*Pisidium pulchellum*

Jenyns.

do.

—

P. pusillum (Gmelin).

do.

—

P. personatum Malm,

do.

—

P. nitidum Jenyns.

do.

—

P. amnicum (Müller).

—

—

—

Pisidium lilljeborgi
Clessin.do. Thingvellir and
Rautharvatn.

—

—

P. casertanum Poli.
Isafjördr.

—

—

P. obtusale Pfr. Thing-
vellir.

—

—

P. steenbuchi Möll.
Thingvellir.*Planorbis rotundatus**Planorbis leucostoma*

—

—

Planorbis spirorbis (L.).

—

—

Planorbis glaber Jeffr.

—



**LIMAX CINEREO-NIGER var. STROBELI Lessona,
NEW TO BRITAIN.**

BY W. DENISON ROEBUCK, L.F.S.

(Read before the Society, December 11th, 1912).

ON the 30th September, Mr. Charles Oldham sent me various slugs, amongst which was an example taken the same day in a wood near Marlin Chapel, Berkhamsted, Herts., which is the first I have seen of this variety. It is entirely ashy-grey and corresponds to the description on p. 59 of Mr. Taylor's Monograph, the ground colour showing as paler maculations on the darker surface-coloration. There is also a variety *strobili* of Pini, but this is a subvariety of var. *cinerea*, and has the shield bluish-black instead of the ash-grey of Lessona's variety of the same name.

CENSUS AUTHENTICATIONS.

BY W. DENISON ROEBUCK, HON. RECORDER.

All the records here given are based upon examples sent to the official authenticators: myself for slugs only; Mr. Fred. Taylor for *Paludestrinidae*; and Mr. John W. Taylor for all other species].

Cambridgeshire: Mr. Geo. S. Carter on the 17th of April, 1912, sent me living examples of *Agriolimax leviss*, which he had, on the 14th, found in the Rectory Garden, Castle Camps, and in a wood close by.

Galway South-East: Mr. R. A. Phillips has sent the following: two *Vertigo pygmaea*, and one *Acroloxus lacustris*, taken at Lough Rea in May 1911; and two *Planorbis umbilicatus*, dead, taken at Portumna, November 1909.

Gloucester East: Mr. Charles Upton has sent his example of *Sphaerium pallidum*, which he took in the Gloucester and Berkeley Canal at Sharpness. Mr. J. Davy Dean has submitted several examples of *Clausilia biplicata*, which were collected at Leckhampton Hill.

Kent East: Mr. F. H. Sikes has submitted the following new county records: *Hyalinia fulva* from Yalding, First Lock; *Aplexa hypnorum* from Hunton.

Kent West: Mr. F. H. Sikes did good work whilst residing at Benover near Yalding, and, amongst numerous other species, sent for authentication: *Pisidium pulchellum* and *P. subtruncatum*, from stream at Benover, the latter also from pond near Teston; *Bythinia tentaculata* var. *producta* from Benover. In the Essex Museum are examples of *Ceciloides acicula* from Chiselhurst (Sowerby and Fulton).

Co. Kilkenny: Mr. R. A. Phillips has submitted *Paludestrina confusa*, of which he took several at Rosbercon, April 1912.

King's County: Mr. G. P. Farran has sent several examples of *Pupa anglica* from Clonmacnoise, taken 27th June, 1899.

THE LAND AND FRESHWATER MOLLUSCA OF IONA.

By JOHN F. MUSHAM, F.E.S.

(Read before the Society, October 13th, 1912).

IN addition to my own experiences, I have been enabled, through the kindness of Mr. J. R. le B. Tomlin, who drew my attention to the same, to make extracts from an earlier paper read by Mr. A. Somerville, B.Sc., F.L.S., before the Natural History Society of Glasgow on April 24th 1888, on the Land and Freshwater Mollusca of this island.

Mr. Somerville writes thus:—"On the occasion of a visit to the island of Iona in October, 1887, I devoted a short time to the investigation of its Land and Freshwater Mollusca, and though I cannot claim to have exhausted the species occurring on the island, it may be of interest to mention that sixteen rewarded search, one being aquatic, and the remainder, including the slugs, terrestrial."

Thus, after a lapse of 25 years, our experiences almost tally, each taking 16 species, though not quite identical.

He further writes: "The western and uninhabited side of Iona faces the Atlantic, and is rocky excepting towards the middle, where there is an open bay from which stretch up sandy, grass-covered undulations. Here *Helix ericetorum* Müll. and *Bulimus acutus* (Müll.) were swarming, as they do in many similar places on the west of Scotland from the Butt of Lewis to the Mull of Cantyre, and on the sandy Ayrshire coast.

On the eastern or inhabited side of the island, under stones near human dwellings, most of the species were found, and of these the most plentiful was *Helix sericea* Müll., a local, though widely distributed form, so named from its epidermic covering of fine white silky hairs, which do not easily rub off."

Nowadays, however, one's attention cannot fail to be drawn, as soon as the village street is left behind, to the quantities of *Helix aspersa*, *Helicella itala*, and *H. acuta*, which abound everywhere; further added to on the eastern side, by quantities of dead and bleached *Helix nemoralis* L., *H. hortensis* (Müll.), and a few *H. arbustorum* (L.).

This bleached condition of practically all the living shells noticed during my visit is not alluded to by Mr. Somerville.

I found that living full-grown specimens of *Helicella itala* and *H. acuta* were scarce, though juveniles swarmed wherever it was sandy; incidentally I might allude to the partiality for old leather, beloved

of many of our land shells, twelve fine specimens of *Helicella acuta* turning up in an old boot !

The chief object of my visit, however, was to obtain if possible examples of the shell-necklaces, formerly sold here by the children to visitors, an old custom dating from the time of the monkish occupation of the island, shells and jade pebbles being in great request as mementoes, and alluded to by Wordsworth in his sonnets.

These necklaces are nowadays seldom made and therefore difficult to procure ; modern visitors preferring picture post cards and articles of pebble and marble, sold here, but made elsewhere. The necklaces were turned out in different sizes according to the shell used, some entirely made of *H. nemoralis*, others of *itala* or *acuta*, and again of all three together ; dead shells from the dunes were mostly used, mixed with any live ones picked up at the time of gathering, the animal not being removed. Mr. Welch informs me that the necklaces made from *Helicella itala* differ from the Donegal examples, in that these are threaded through the apex, and not through the mouth and upper part of the larger whorl.

It is noticeable that they are invariably made up with black thread ; on inquiring the reason, I was informed it was the custom, though no reason for it was forthcoming. Marine shells (periwinkles) would occasionally be used in the manufacture of these necklaces, but, requiring boring before threading, were only adopted by the more industrious.

Mr. Somerville concludes his paper by stating that all his shells were submitted to Mr. J. W. Taylor for verification, and adds,—“Iona consists chiefly of schistose rocks of the middle Silurian period. It is one of the mid Hebrides (or central group of the inner Hebrides which form the British Vice-County, No. 103), and which in addition to Mull, includes Coll, Tiree, Ulva, and in the words of Sir Walter Scott—

‘ All the group of islets gay
That guard famed Staffa round.’ ”

The following is a joint list of observations :—

Arion ater (L.).—Very large and abundant, referable to var. *ater-rima* Taylor. Somerville, “our common black snail.”

A. bourguignati Mabilie.—Somerville.

Limax maximus L.—One or two near the Nunnery.

Agriolimax agrestis (L.).—Pale forms abundant. Somerville, “the common pale-brown slug.”

Limnæa pereger (Müll.).—Somerville, “common in a stream in the middle of the island.”

Vitrina pellucida (Müll.).—Somerville.

Hyalinia cellaria (Müll.).—Generally distributed under stones by roadside. Found also by Somerville.

H. alliaria (Miller).—Somerville.

Helix aspersa Müll.—Numerous on Yellow Iris, Stonecrop, walls of the ruins, and in the village gardens and high rocks. Somerville, "Found on the eastern side, but also in some abundance on the rock faces and in the crevices of the high shore rocks on the western side, where it seemed to be meditating hibernation."

H. aspersa m. **scalariforme**.—A fine example was taken by me, crawling over a rock face on the western side.

H. nemoralis L.—Dead shells occurred in quantities on the eastern sand dunes, living ones far from numerous; a solitary colony confined to the higher rocks on the western side, of much lighter texture than the dead ones above mentioned, many with white lips, small and *hortensis*-like in appearance, animals pale (the Donegal form). An examination of the darts soon proved their identity, whilst of interest was the deep Indian red colour of the liver of two thirds of the bodies examined. Somerville, "on both eastern and western sides."

H. hortensis Müll.—One or two dead ones only on the eastern sand dunes. Somerville, "on both eastern and western sides."

Helicigona arbustorum (L.).—A few dead shells on the eastern dunes.

Helicella itala (L.).—Abundant, especially juveniles; adults scarce, two or three charming vars. Somerville, "abundant in most parts of the island."

Hygromia granulata (Alder).—A few in a nettle bed near the hotel, and again in a similar habitat near the cable mark. Somerville, "common under stones on the eastern side."

Pyramidula rotundata (Müll.).—Frequent in and around the village. Found also by Somerville.

Helicella acuta (Müll.).—Swarming where sandy, especially in the juvenile stages. Somerville, "plentiful."

H. caperata (Mont.) var. **heripensis** (Mab.).—Under a stone near the cable mark.

Cochlicopa lubrica (Müll.) var. **lubricoides** Fér.—Sparingly under stones near the cable mark. Somerville records the species, but makes no mention of a var.

Pupa cylindracea (DaCosta).—Numerous in ruins of a cottage and on boundary wall of Cathedral. Found also by Somerville.

Clausilia bidentata (Ström).—Numerous on boundary wall of Cathedral, and in a cottage ruin near the landing slip.

CONCHOLOGICAL NOTES FROM ALGERIA AND TUNIS.

BY LIONEL E. ADAMS, B.A.

(Read before the Society, June 12th, 1912).

TO ANY one ambitious to collect land shells, especially Xerophiles, in bulk, I can recommend Algeria and Tunis. As one wanders among the scrub-covered sandhills along the coast, the booty need only be limited by the means of transport. Grass, bushes, and tree trunks are covered with shells, chiefly *H. pisana*, the general whiteness of which gives a curious appearance to the landscape. The *pisana* were disappointing, being mostly of a dingy white colour with faint nondescript bands, though here and there I found some of the beautiful forms figured as Algerian in Taylor's "Monograph," pt. 19, forms of var. *rosaceo-albida* Bourg. being especially common throughout.

Helix virgata distributed throughout were mostly small and of the single banded form.

Helix acuta has here a habit of æstivating in masses on tree trunks and bushes; I never met with it far from the sea.

H. caperata, which I only found at Bona and Tunis was not common. I found all these species somewhat smaller, on the average, than British specimens, and considerably more solid.

Though I have often picked fine series of large *Helix aspersa* and *H. bredeana* Debeaux in the markets of Algiers and Oran, I have never seen *H. pisana* exposed for sale on Algerian stalls as is commonly the case in France, Sicily, &c., and I can only account for its neglect by a people usually the reverse of fastidious, by supposing that the scrub upon which it feeds renders it unfit for human consumption.¹ The markets at Constantine yielded a nice series of *H. aspersa* s.v. *maxima* Taylor, and also of the self-coloured bandless form, which is never as large, in Algeria, as that with bands. Among the ruins of Timgad var. *conoidea* Pic. was predominant.

At Biskra, among the scanty scrub at the edge of the Sahara, I found a few small *H. virgata*, chiefly dead shells, that looked as if they had been gnawed. It may be that the Jerboas, whose tracks were abundant, feed upon them; I saw no tracks of any other animal at all likely to do so. Among a most interesting assortment of desert plants at the famous sulphur spring near Biskra, I found *Leucochroa candidissima* Drap. in considerable numbers, a few *H. vermiculata* and *H. virgata*. Dr. Longstaff, however, in his

¹ J. W. Taylor, in "Monograph," pt. 19, p. 375, speaks of its being "regularly brought to market."

charming book, "Butterfly Hunting in many Lands," while minutely describing the same spot, with the Jackals, Jerboas, Snakes, &c., omits all mention of Snails! Wandering in the Jardin Landon (made famous by Robert Hitchens in "The Garden of Allah") I only came upon a single snail, *H. vermiculata*, which had escaped the gardeners' vigilance. Near the garden runs a stream in which I found the only freshwater species that I saw in Algeria—*Melanopsis dactylophila* Issel. It was amusing to be told by nearly every one of the numerous guides and touts that pester the traveller at Biskra, that they were personal friends of the author of the book that introduced Biskra to the tourist! Some even produced a card with the author's name thereon, which some enterprising scamp had, doubtless, had printed for sale amongst the guides.

One of the most interesting spots in North Africa is, of course, the Bay of Tunis and the ruins of Carthage. While basking in the warm sun in the amphitheatre, the scene of bloodthirsty displays, I came upon a small colony of curiously marked *H. pisana*—pure white above, darkly banded below.

As a considerable amount of rain falls in Algeria, and deep snow renders the mountain roads impassable in winter, it is advisable for the conchologist to select the late autumn or early spring for a collecting tour. In the hot summer months the hotels of Biskra and other inland places are mostly closed, and the snails æstivating out of sight.

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN & IRELAND.

417th Meeting, held in Manchester Museum, Dec. 11th, 1912.

Mr. B. R. Lucas in the chair.

Additions to the Library announced and thanks voted :

"The Cephalopoda of the Scottish National Antarctic Expedition," by Dr. W. E. Hoyle. "Die geographische Verbreitung der westdeutschen Najaden," by Dr. F. Haas. "Descriptions of thirty-three New Species of Gasteropoda from the Persian Gulf, Gulf of Oman, and North Arabian Sea," by J. C. Melvill. "Manual of Conchology," part lxxv., by H. A. Pilsbry (from the respective authors); and the usual periodicals received in exchange.

Donation to the Cabinet announced and thanks voted :

By Mr. Chas. Oldham—*Limax cinereo-niger* var. *luctuosa*, with malformed and disjointed keel-line, from Berkhamsted.

Candidates proposed for Membership.

Ronald Winckworth, 37, Upper Rock Gardens, Brighton.

J. W. Roberts, 145, Withington Road, Whalley Range, Manchester.

New Members Elected.

Thos. Bonner-Chambers, Huccombe, Stokenham, Kingsbridge, S. Devon.
L. R. W. Loyd, 17, Sandringham Court, Maida Vale, London, W.

Members Deceased.

D. D. Baldwin. Rev. Thos. Cook. Rev. G. W. Taylor, F.R.S. (Canada).

Resolutions of sympathy with the relatives of the deceased were passed, and obituary notices will be published as early as possible.

Papers Read.

"The Mollusca of Worcestershire," by N. G. Hadden.

"*Clausilia rolfii* Leach in Salop," by N. G. Hadden.

"Pathological malformation of keel-line in *Limax cinereo-niger*" by W. Denison Roebuck, F.L.S.

"*Limax cinereo-niger* var. *strobili* Lessona—new to Britain," by W. Denison Roebuck, F.L.S.

Exhibits.

By Mr. T. H. Platt : A beautiful series of *Opisthostoma mirabile*, *O. fairbanki*, and twenty other species of this remarkable genus.

By Mr. G. C. Spence : A series of *Hybocystis*, with young of *H. elephas*, showing the wide difference in form between adult and juvenile ; *Brachypodella diminuta* sectioned and contrasted with *B. agnesiana*.

By Mr. H. Allan, jr. : A fine series of Land Shells from Tenby.

418th Meeting, held in Manchester Museum, Jan. 8th, 1913.

Mr. E. Collier in the chair.

Additions to the Library announced and thanks voted :

"Mollusca from the Lea Valley Arctic Bed," by A. S. Kennard and B. B. Woodward. "Marine Mollusks from Indre Sogn," by James A. Grieg; and the usual periodicals received in exchange.

Candidates Proposed for Membership.

William H. Western, editor "Lancashire Naturalist," 9, Redearth Road, Darwen (recommended by R. Standen and J. W. Jackson).

Bertram Bryan, 176, Uttoxeter Road, Longton, Staffs. (recommended by J. R. B. Masfield and E. D. Bostock).

Henry Emmett, 156, Moston Street, Hanley, Staffs. (recommended by J. R. B. Masfield and E. D. Bostock).

John Chalmers, São Thomé, Gulf of Guinea (recommended by L. J. Shackleford and R. Standen).

New Members Elected.

J. W. Roberts, 145, Withington Road, Whalley Range, Manchester (recommended by T. H. Platt and J. W. Jackson).

Ronald Winckworth, 37, Upper Rock Gardens, Brighton (recommended by J. W. Jackson and L. J. Shackleford).

Paper Read.

"The Non-Marine Mollusca of Iceland," by F. H. Sikes, M.A., F.L.S.

Exhibits.

By Rev. L. J. Shackleford : *Achatina sinistrorsa* Ch., from São Thomé, Gulf of Guinea (alt. 4,000 ft.).

By Rev. Canon Horsley : *Physa heterostropha* (?) from Savona Lake, British Columbia.

By Mr. J. Davy Dean : *Hyalinia nitidula* var. *lucens* Pult. from Silverdale, var. *nitens* Mich., Grange : *Pupa anglica* Fér. from Sawry-on-Windermere ; *Ena obscura* Müll., Penrith ; *Planorbis albus* L. and *Valvata cristata* Müll. from Bankwell, Silverdale ; also interesting varieties of *Helix nemoralis* and *Helicigona arbustorum* from the Furness district.

By Mr. G. C. Spence : *Helicella herpensis* from Hambledon, Hants. ; scalariform *H. nemoralis* from Portrush, Ireland ; a small dark form of *Cypræa annulus* from Marquesas Islands ; and a number of species of *Chondropoma*.

By Mr. T. H. Platt : A fine series of about thirty species of *Odontostomus*, *Tomigerus*, *Anctus* and *Anostoma* from Monte Video, Rio Janeiro and Bahia.

By Mr. F. H. Sikes : A collection of mollusca from Iceland, collected in 1912, to illustrate his paper.

The special exhibit of the evening was the genera *Lanistes* and *Marisa*, a number of species being shown by Mrs. Gill and Mr. C. H. Moore ; whilst Mr. R. Standen showed shells and eggs of *Lanistes olivacea* from Zanzibar, and *Marisa cornu-arietis* from Trinidad, from his own collection ; also fine examples of many species from the "R. D. Darbshire Collection" and the "Neave Collection" in the Manchester Museum.

419th Meeting, held in Manchester Museum, Feb. 12th, 1913.

Dr. James Cosmo Melvill in the chair.

New Members Elected.

William H. Western, editor "Lancashire Naturalist," 9, Redearth Road, Darwen.

Bertram Bryan, 176, Uttoxeter Road, Longton, Staffs.

Henry Emmett, 156, Moston Street, Hanley, Staffs.

John Chalmers, São Thomé, Gulf of Guinea.

Member Deceased.

Mrs. Janet Carphin.

Papers Read.

"*Eutrochatella* and its allies," by J. Cosmo Melvill, D.Sc., M.A., F.L.S.

"Notes on three species of *Cypræa*," by J. Kidson Taylor.

"The Non-Marine Mollusca of Touraine," by F. H. Sikes, M.A., F.L.S.

Exhibits.

By Mr. F. H. Sikes : Series of Land and Freshwater Shells from around Loches, Indre-et-Loire, to illustrate his paper.

By Mr. J. Kidson Taylor : A fine series of the species of *Cypræa* dealt with in his paper and a number of rare species for comparison.

By Mr. J. Cosmo Melvill : Beautiful examples of the extremely rare *Volutes*—*Voluta concinna* Brod. from Japan, and *V. irvine* from W. Australia.

By Rev. L. J. Shackleford : Fine examples of *Paryphanta busbyi* Gray, *P. hochstetteri* Pfr. from New Zealand, *P. atramentaria* Sh. from Australia, *Voluta flavicans* Gmel., and the var. *tissotiana* Crosse, *V. imperialis* Lam., *V. scapha* Gmel., a fine specimen with pure white ground colour ; *V. pacifica* Sol., a large aged specimen with margined lip nearly an inch wide ; and *V. rossiniana* Bern. from New Caledonia.

In the special exhibit of *Eutrochatella* about two-thirds of the known species of this beautiful genus were shown by Mrs. Gill, Messrs. G. C. Spence, R. Standen, and J. Cosmo Melvill, who read an interesting paper dealing with the exhibit ; specimens from the Museum Collection were also shown.

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JULY, 1913.

No. 3.

ADDITIONS TO "BRITISH CONCHOLOGY."

BY J. T. MARSHALL.

PART VII. (*continued from p. 35*).

Aplysia punctata Cuv.—Between tide-marks during the spring months, when this species resorts among the seaweed-covered rocks for spawning, and may then be met with in large numbers, though their visits are capricious and their numbers varying. In Jersey, where an enormous extent of rocky coast is uncovered at low water, they may in some seasons be estimated at millions! I have found the fry in dwarf sea-weeds during August and September; in October these had attained half-an-inch in length, with shells a line long.

The shell consists of two layers, which in this species are both horny, except in aged specimens or to repair fractures, when they are semi-calcareous; while in *A. depilans*, which it resembles, the inner layer is shelly, very fragile and brittle, and easily shed. The largest come from St. Mary's Flats, Scilly, and measure $1\frac{1}{2}$ in. by $1\frac{1}{4}$ in.

The animal is an easy and very interesting subject for dissection. After making an incision and removing the shell, the whole of the nervous system is exposed to view, and may be readily lifted out intact for examination.

A. depilans L.—A very rare visitant to Guernsey and Torbay. In the former locality solitary specimens are obtained at wide intervals; but in Torbay a small fleet arrived in 1875, and lingered for a couple of years, but failed to establish itself, though the temperature and position of Torbay would seem fairly promising for its acclimatisation. Previous to that only one specimen had been found there, by Mr. P. H. Gosse. Landsborough and Kennedy have recorded it from the Clyde district, but their identifications are extremely unlikely.

The shell of *A. depilans* differs from that of *A. punctata* in being three or four times the size, lighter in colour, thinner, and much less convex or boat-shaped. It will not bear much handling, and if not extracted from the animal with the greatest care the internal shelly layer breaks up into minute fragments, and the external horny one curls up out of all resemblance to its natural shape. The dye from the animal is a pale to a deep purple, according to the more or less

collapsed condition in which it arrives on our coasts. My largest Torbay specimen of the shell is 2in. by 2in., and from Guernsey 2in. by 1 $\frac{3}{4}$ in. The animal of the former, when crawling, was the size of a cucumber a foot long, and when at rest lumped as large as my doubled fists.

In the respective number of rows of teeth in the two species, quoted by Gwyn Jeffreys on the authority of Mr. Jabez Hogg,¹ there is an error of transposition; it is *A. depilans* that has 70 rows, and *A. punctata* 40, instead of *vice versa*. For an account of the dentition of *A. depilans*, vide A. R. Hunt, Trans. Devon Assoc., 1877, pp. 2-3.

An *Aplysia* from Polperro, Cornwall, has been described as *A. melanopus* Couch,² but I consider it a very doubtful species.

Pleurobranchus membranaceus Mont.—Jersey (Duprey and J.T.M.); Scilly (Smart)! Isle of Man, not uncommon (Herdman); off Cumbrae (Norman). It is also said to have been “frequently taken” in the Clyde by the yacht ‘Medusa.’

This is a gregarious species, appearing only at intervals, and sometimes in great numbers; I have known quite 100 obtained in one haul of the trawl. In 1874 a large fleet of them appeared simultaneously at Weymouth and Torbay, and again in the latter district in 1877 and 1887. The animal is not “thick,” as stated by Jeffreys, but gelatinous and watery, and if left for a few days exposed on the beach dissolves away like the Medusæ. There is no doubt of its mantle containing spicules similar to those in the Nudibranchiata, as the handling of them for any length of time produces blistering and scarifying at the tips of the fingers, similar to the action of a strong acid. The same effects are produced by handling that fine nudibranch *Tritonia hombergi*, which occurs with it in South Devon. The shell is usually oblong, but sometimes approaches an oval; it is highly iridescent, and occasionally pearl-white. According to Pilsbry, *P. membranaceus* Mont. (1811) is subsequent to *P. tuberculatus* Meckel (1808).

P. plumula Mont.—Jersey (Duprey and J.T.M.); Scilly Islands (Smart and others); Penzance, Borough Island, Torbay, Weymouth, Killala Bay.

var. **alba** Marsh., *Journ. of Conch.*, 1893, vol. vii., p. 265.—Bordeaux Harbour, Guernsey (Tomlin); Jersey and Scilly.

This species has a much more substantial shell than the last, but is extremely brittle. Very young ones are occasionally found in shellsand, and resemble a bleached *Otina otis*; but the latter is more convex, with a longer spire, and the circumference of the aperture is

¹ Brit. Conch., vol. v., p. 8.

² Proc. Zool. Soc., 1870, pp. 173-5 (with woodcuts).

continuous. It is scarce, but more plentiful and larger at Scilly than elsewhere, whence Mr. Clifford Burkill has taken as many as 40 in a tide, and six under one stone.

Nudibranchiata Cuv.—The nudibranchiate mollusca have undergone much investigation, and a great deal has been written on the subject, since "British Conchology" was published, while even what that work contains is admittedly only a compilation of Alder and Hancock's researches, published more than a decade previously. Canon Norman, than whom no British writer is better qualified to deal with this family, brought it up to date and published it in the "Annals" for 1890, vols. v. and vi.

Assiminea grayana Leach.—The habitat for this species given by Jeffreys, "Banks of the Thames between Greenwich and a little below Gravesend," though nearly correct when his work was written, has undergone considerable change in the interval. Previous to that time Dr. Gray, Mr. Clark, and others found it abundantly between Greenwich and Woolwich, but when Gwyn Jeffreys wanted living specimens to illustrate his work, he could find only two specimens after the most diligent search, assisted by myself. Subsequently, however, I found them in great numbers at Abbey Wood and Erith, lower down but on the same side of the Thames, and as this is now its nearest locality to London, it would appear to have migrated for about ten miles towards the sea. During the same interval a near neighbour of this species, *Hydrobia similis*, has almost disappeared from the same district, where it was common 30 years ago, and *H. jenkinsi* has arrived to supplant it. Mr. J. E. Cooper mentions it from Sandwich, and also as living "in abundance on the banks of the Blyth near Blythburgh," while Mr. Mayfield has recorded "a few examples" from the rejectamenta of the river Alde in Suffolk, and there are several other records cited by him, some of which at least require confirmation. It may easily be mistaken for one of the many forms of *Hydrobia ulvæ*.

A variety has a narrower and rounded base, with a deeper suture. Jeffreys' figure exhibits an umbilicus, which is incorrect; but his *generic* figure is right in this respect. In Sowerby's the mouth is much too large, besides being wrongly shaped, and neither figures are sufficiently conical.

A. littorina Del. Ch. — Caldy Island (Williams-Vaughan) ! Guernsey, Sennen Cove and the Lizards, Torbay and Dartmouth, Portland Island. An Alderney record by Mr. Marquand is not this, but a minute form of *Littorina rudis* var. *saxatilis*.

var. **pallida** Jeff., Ann. Mag. N. Hist., 1859, vol. ii., p. 196.—Found occasionally with the type at Torbay, Portland, and Weymouth.

Melampus bidentatus Mont.—This species lives on the open coast, either under stones or in crevices of rocks and harbours, between tide-marks, while the var. *alba* lives in sheltered bays and at the mouths of rivers, from the Shetlands to Jersey. It is extremely variable in shape, varying from a short globose form to a slender cylindrical one. A rare form from Torbay has a longer spire and tumid whorls, resembling in outline *Limnæa truncatula*, while a monstrosity from the same district has only one tooth. The teeth of the aperture are present at all stages of growth, and aged specimens, both of this and the next, have the pillar abnormally thickened by a shelly deposit. The shell is nearly always white, but I have some specimens flesh pink and others light grey.

Jeffreys' figure does not show the flexure on the upper part of the outer lip; Sowerby's figure does, but the teeth in the latter are equalized, instead of the upper one being twice as large as the lower.

M. myosotis Drap.—Gregarious nearly everywhere from Jersey to Shetland.

var. **ringens** Turt.—Equally diffused with the type, but more marine, though on the open coast at Dover both forms live together, the variety predominating. The colour is whitish, pale yellow, or horn-colour of various shades, and the outer lip is furnished with tubercles and teeth, varying in size, space, and number, ranging from one to ten. In addition, it occasionally has the same rows of bristles surmounting each whorl, though Jeffreys' figure exhibits it in the type only. Like the last species, the variations are extreme, from an attenuated slender form to a short globose one. The largest come from Portland Island, and attain 4 lines by $1\frac{1}{2}$. I am indebted to Mr. Charles Jefferys, the naturalist, of Tenby, for some very fine specimens of this variety, which he had procured from a most remarkable habitat—"a narrow fissure extending about 140 feet subterraneously, about 45 feet above high-water mark, and 60 to 80 feet below the top of the cliff. The *Melampus* are about 120 feet from the entrance to this fissure, and are localised in one spot about two feet square. This fissure is nowhere more than two feet wide by five to seven feet high." From another correspondent I am informed that these *Melampus* hold their position in hundreds through the agency of a blow-hole, which in rough weather imparts some degree of moisture to them. This habitat is in the dark, and the *Melampus* must be searched for with a lantern.

Jeffreys' figures are perfect, except that he makes the var. *ringens* a more graceful shell than the type; but there should be no difference between them in that respect. Sowerby's figures are too

oval and stumpy, the pillar lip of var. *ringens* should have only three teeth instead of four, while the outer lip, instead of having four equalised teeth, should represent them as irregular in size and shape, and there are invariably more. Forbes and Hanley, again, figure quite another set. Specimens like all these figures are found, but they are not types, nor do they accord with the authors' descriptions. *M. reflexus* Turt., figured by Sowerby, is an extreme form of var. *ringens*.

Both the preceding species of *Melampus* have many generic and specific synonyms, the most legitimate of which should by this time be established, but that cannot be done by writers simply ringing the changes on different names, and arbitrarily substituting one for another without vouchsafing any enlightenment as to the why or the wherefore. Previous authors have their rights, and if they are to be deposed or ignored let it be on solid and stated grounds, so that every one may judge of their validity.

Otina otis Turt.—Cumbrae (Robertson).

var. **candida** Jeff.—Newquay (Cooke); Freshwater West (Tomlin); Guernsey and Herm, Scilly Islands, Land's End, Torbay, Borough Island. There is a pale brown form intermediate between this and the type, which often has a zone of lighter colour a little below the suture of the last whorl (best seen in pale specimens), and in the var. *candida* it is opaque.

Otina hunting is a thing emphatically to be learnt. It affects dark and shady crevices in the rocks, and when crawling appears like a little speck of gelatine, on account of the animal being too large for the shell. The collector should search the rocks or caves a little below high-water line, looking very closely at places where there happen to be tricklings of moisture on the surface, and he may soon see little jelly-like spots of a grayish white, which is the colour of the animal. Once successful he will soon learn to distinguish the shell. It is not uncommon, and in a few places, Sark and Salcombe especially, it is abundant.

Pteropoda Cuvier.—This Class has been sadly neglected and as sadly confused by writers; but Dr. Paul Pelseneer, in the 'Challenger' Reports, has placed it on a sound basis as far as published records allow. He has not, however, taken in hand MS. or undescribed forms, for obvious reasons. Speaking generally of the Class, he says that "these pelagic molluscs descend to a certain depth to avoid bright light, and reascend when the light is feeble or absent and the sea is calm."

Limacina retroversa Flem.—"North Atlantic, on the coast of America, from 63 deg. N. (Davis Strait) to 39 deg. 53 min. N. (Mas-

sachusetts Bay, Verrill); Iceland; coasts of Europe from Lofoden Islands to 50 deg. N., though not yet recorded from Behring Straits."¹ Dr. Pelseneer considers our species to be *L. trochiformis* D'Orb. and not *L. retroversa* Flem. (while most writers treat them as synonyms); that all records which mention the latter as having been found in more southerly latitudes than 50 deg. N. are erroneous, and ought to apply to *L. trochiformis*; and that both species "have been deplorably confused by Jeffreys, MacAndrew, Weinkauff, A. Costa, Monterosato, &c. . . . *L. trochiformis* differs from *L. retroversa*—(1) in the oval form of the mouth, which is rounded anteriorly and has the columellar margin recurved to the left, in contrast to *L. retroversa*, where the mouth is quadrangular, pointed anteriorly, and with a rectilinear columellar margin; (2) in the constant shortness of the spiral in proportion to its last whorl; and (3) in the formation of the operculum, in which the spiral portion is large in *L. trochiformis*, and very small in *L. retroversa*.

var. *macandreae* F. & H.—Jeffreys does not give any localities for this variety, but as he says it "diverges insensibly from the type," he may have meant that it was equally diffused, though I have not found it so. The original record was "15 miles south of Mizen Head, in the south of Ireland, several specimens," which has not since been added to; but I can now give the following localities—Killala Bay (Miss Warren and J.T.M.); Flugga Light, N. Shetlands (Simpson)! Guernsey 22f., Scilly Islands 40f., Land's End, Eddystone 30f., the Minch 30-75f., West Orkneys 45f., East Shetlands 18f. It is figured in Sowerby's "Index," but much too slender; Jeffreys' is nearer the mark.

The variety *jeffreysi* of Forbes and Hanley is the immature stage of a large typical specimen, founded on a single example from the "British Channel," but which, according to Jeffreys, is an error for "Bristol Channel," the true locality being Tenby.

In 1886 Miss Amy Warren, of Ballina, found this species washing ashore in Killala Bay; they were "in millions, and appeared like froth." Some of these were comparatively large (1 line by $1\frac{1}{4}$), and more discoid than usual. In 1896, on the same coast, Miss Warren again found an immense deposit of these "ocean butterflies" cast ashore for a mile along the tide-marks in a zone "varying in width from a few inches to three feet, and heaped up in some places two inches in depth, many of the shells containing the animal." Again, Mr. Thomas Scott reports that "on the west coast [of Scotland] it sometimes occurs in immense shoals, and at times forms a considerable part of the food of the herring. I have found the stomachs of

1 Pelseneer, 'Challenger' Pteropoda, part ii., p. 28.

herrings sent to me from the west coast for examination filled with little else than these pteropods, numbers of which appear to have been swallowed wholesale, as some of the shells were practically uninjured."¹

It had long been a moot point whether *L. retroversa* possessed an operculum. Gwyn Jeffreys and others had failed to detect one, although the former was "kindly assisted in the examination by Dr. Carpenter, when many specimens were sacrificed on the altar of science;" but Dr. Pelseneer declares that it really is provided with an operculum, and his authority must be considered conclusive. (Sars has gone further and figured it). It is now believed that all the *Limacina* possess opercula, but that they are shed when the animal becomes aged. Dr. Pelseneer also says that "the surface exhibits longitudinal striæ distinctly recognisable," although it has been generally described as without sculpture. Few shells are really smooth except to the unaided eye, but from a minute examination of fresh specimens with a Coddington lens, and in a strong light, I could detect longitudinal flexuous striæ, which are more clearly discernible under a microscope.

Some dead shells of *L. helicoides* Jeff. were dredged in the 'Porcupine' Expedition of 1869 in the Atlantic off Ireland, 1215 fathoms. Dead shells of another pteropod (doubtfully referred to *Peracle diversa* Monts.) were also dredged off the south of Ireland in 1889 in the 'Flying Fox' cruise.

Cavolinia trispinosa Lesueur has been dredged by the 'Porcupine' off Valentia, by the 'Flying Fox' off the south of Ireland, and by the Royal Irish Academy cruise in S.W. Ireland, besides Jeffreys' record of a specimen having been "washed ashore at Youghal with *Spirula australis*." Pelseneer also quotes "Triton Expedition" for this species, though it is not recorded in Jeffreys' Report of that cruise.

Clio pyramidata L.—Dredged plentifully off the south coast of Ireland in the 'Porcupine' Expedition of 1869, and in the 'Flying Fox' cruise of 1889.

Cephalopoda Cuvier.—A summary embracing the most recent researches into this Family was published by Canon Norman in the "Annals" for 1890.

A pearly nautilus, otherwise "Portuguese man-of-war," containing the animal, was washed ashore at Jersey some years ago, and is now in the Jersey Museum.

¹ Ann. Rep. Fish. Bd. Scotland, 1898, p. 156.

[As the publication of these papers was commenced as long ago as 1893, it has been deemed necessary to add the following supplementary notes to bring the subject up to date].

SUPPLEMENT:
ADDITIONS TO "BRITISH CONCHOLOGY."

Terebratula cranium Müll.—Off Fair Isle, midway between the Orkneys and Shetlands (Simpson)! An alleged "*T. cranium*," dredged in the Bay of Biscay," and presented to the Conchological Society by Mr. Bartlet Span,¹ must have been an error, presumably for *T. vitrea*. Forbes' record of "Tarbert 30 fathoms" must also have been a mistake; this species is strictly confined to the Shetland seas. A remarkably fine but imperfect specimen from the Aberdeen University Museum, sent me for identification, measures $1\frac{3}{4}$ in. by $1\frac{1}{8}$ in.

var. **oblonga** Jeff.—Jeffreys describes this in his work, but gives no locality. It occurs occasionally among typical specimens from East Shetlands. Specimens I have received from Dr. Sparre Schneider, dredged at Tromsø, all belong to this variety.

The Scottish Fishery Commissioners have dredged *T. cranium* in abundance off the Faroes in 71-194f., most of them belonging to the var. *oblonga*. In one haul of the trawl on the Faroe Banks in 1906 "nearly a bushel" of these animals was brought to the surface. I suggested that the trawl may have lighted on a veritable graveyard of the *Terebratula*, brought together by the action of the currents, but my informant, Mr. James Simpson, who was the conchologist during the cruise, replied that it was "not a graveyard haul, but a metropolis of living specimens; there were very few dead among them, and we must have thinned out the population to a considerable extent."

T. caput-serpentis L.—Mr. MacAndrew's record "British Channel," attached to a tablet of this species in the Cambridge Museum, is too vague to be relied upon. There is no definite record of its occurrence on the English coast.

I have found it most plentiful in some parts of Oban Bay, and in comparatively shallow water, and this reminds me that it was in Oban Bay itself whence Gwyn Jeffreys procured it in what was his very first essay in dredging operations, which arose in this way. Walking past the then Mr. Sowerby's shop in Bloomsbury one morning, he was called in and shown a specimen of *T. caput-serpentis*, which had been received from Professor Fleming, and another of *Trichotropis borealis*, which had just been discovered by Captain Laskey. Gwyn Jeffreys promptly offered £1 for the two shells, but was told they were well

worth £1 apiece, though they were not for sale, as they belonged to Professor Fleming; "but," said Sowerby, "why do you not go and get some for yourself," and suggested that Jeffreys should have a dredge made and try his fortune at Oban. The dredge was accordingly made, and a place taken in the coach for Oban, it being before the era of a railway; but when he went to take his place inside the coach he found it occupied by two irascible sportsmen, surrounded by their shooting gear, who strongly objected to Jeffreys' dredge and sieves and other impedimenta, wanted the inside space to themselves, and suggested that Jeffreys should go outside with his d—d sticks. Jeffreys refused, and insisted on space being found inside for him and his belongings, and so the coach started with scarcely room to move, and the whole journey was spent in wrangling and quarrelling, each party when they wanted to move their limbs viciously kicking the others' belongings out of the way with increasing violence. However, this unpleasant journey came to an end at last, and after a fortnight's dredging Jeffreys found himself well rewarded with a quantity both of *Trichotropis* and *Terebratula*, of which he gave Sowerby a handful of the latter in gratitude for his advice and as a reward for his suggestion, and these were afterwards retailed at 10/- apiece.

var. **septentrionalis** L.—This variety is nearly white, more compressed, and more finely sculptured, but can easily be graduated from the type. Some writers, among them strange to say Dr. Davidson, have regarded this as a true species on account of its possessing an alleged epidermis; but the latter is in reality a sponge, of which several micro. species seem to particularly favour this shell. (See Norman: A Month on the Trondhjem Fiord, Ann. Mag. N. Hist., Dec., 1893, vol. xii.)

T. septata Phil.—Shetlands 80-90f., young, with *T. cranium* (Jeffreys).¹ In my previous notice of this species I recorded the fact that "30 specimens were obtained in one haul of the dredge off the Shetlands by the 'Porcupine,'" but I should have added that these were not all available for science. Unfortunately at that time Gwyn Jeffreys had had his share of the cruise, and had left the 'Porcupine,' and there was no one in authority to guard the spoil, so that when this particular dredging was emptied on the deck, the officers of the ship gathered round and treated the "rubbish" (as they called it) with much irreverence, finally kneeling round it, like boys at marbles, and pelting each other with such treasures as *T. septata*, &c. It does not seem to have been met with by the Scottish Fishery Commissioners during their researches, with the exception of three

¹ Moll. 'Lightning' and 'Porcupine,' Proc. Zool. Soc., 1878, p. 407.

² Adds. to "Brit. Conch.," Journ. of Conch., 1894, vol. vii., p. 379.

specimens which are recorded by Mr. Simpson, but without locality and depth, though probably between the Orkneys and Faroes;¹ and Mr. Tomlin's collection contains several examples from deep water off the Western Shetlands.

T. papillosa Marsh., *Journ. of Conch.*, 1887, vol. v., pp. 186-90, and p. 278, pl. i., figs. 1-3; Sowerby's Ill. Ind. Brit. Shells, p. xvi., with woodcut.—This proves to be the same species as *T. striata* D'Orb., a cretaceous fossil shell.

Terebratella spitzbergensis Dav.—On the slope of the English Channel, 690f., two young specimens ('Porcupine')!

Atretia gnomon Jeff.—This is a very interesting addition to British conchology. Mr. James Simpson, in one of the summer cruises of the Scottish Fishery Commissioners, obtained a specimen from the Minch in 63f. It was "brought up in the small trawl perfectly fresh, and to all appearance had been alive when taken up."² A *gnomon* was originally dredged during the 'Valorous' expedition to Greenland.

Argiope Desh.—According to Monterosato³ *Argiope* was adopted by Savigny and Audouin for a genus of spiders in 1827, which is prior to *Argiope* Desh. (1842), after which comes *Megathyris* D'Orb. (1847).

Gwynia capsula Jeff.—Clyde (Scott)! off Robin Hood Bay, on the Scarborough coast, 30-35f. (Brady).

The *Platydia anomioioides* of Scacc. and Phil., a very rare brachiopod, has been dredged off the Butt of Lewis in 305f. by the 'Knight Errant.'

Ostrea edulis L.—The little Shetland oyster (var. *tincta* Jeff.) is smaller than the British native (var. *rutupina* Jeff.), highly coloured inside, and does as little in the house-building line as it possibly can. The largest (var. *hippopus* Jeff.) appears to thrive best on some parts of the Irish coast, notably Belfast and in the Belfast estuarine deposits, specimens frequently weighing 2-lbs. and over. One specimen was dredged off county Down in 1895 which was 21 in. in circumference, weighed 38 oz., and was "considered to be 60 years old"! though how the latter estimate was arrived at is not clear. Another huge oyster was dredged by a fisherman at Williamstown in 1893 which was two feet in circumference, 17 in. in diameter, and weighed 7-lbs., while a huge valve in the Belfast Museum, from the Belfast deposit, is 5-lbs. in weight.

The oyster as a rule spawns in May, June, and part of July, and is then more or less unwholesome. The spawn or spat is at first of a

¹ *Journ. of Conch.*, 1910, vol. 13, p. 115.

² Notes on Rare Moll., *Journ. of Conch.*, 1910, vol. 13, p. 115.

³ Nomenclatura, p. 1.

cream-like colour and consistence, but as it matures it turns greyish and assumes the appearance of slate-dust, and when the parent at length opens its shell and emits the spat, the water becomes misty and then turbid. The new-born oyster is very rudimentary at first, but it possesses a pair of tiny shells, the very miniature of the parent, and this forms a pretty and favourite object for the microscope. Then, by means of a number of cilia attached to the mantle, the infant oyster spins about freely for the first three days of its existence, and it is at this stage that its numbers are so greatly reduced and the cause of its high price kept up, for an open-mouthed fish passing along will swallow hundreds at a gulp. The comparative few that escape this peril then settle down and attach themselves to an anchorage for life, while the cilia, no longer of any use, disappear. In a fortnight the baby oyster has grown to the size of a pin's head, in a year it is as large as a halfpenny, and during the fourth year it is considered at its best and is then marketable, while its natural life is considered to be about eight years.

The modern system of oyster culture, of course, seeks to obviate the above dangers by taking the oyster from its rough-and-tumble life in the stormy seas and placing them in rich and quiet estuarine waters. Several attempts have been made in the Channel Islands, notably at Herm, to cultivate them in catch-pools between the tide-marks, but in addition to its usual enemies it had here to encounter the Octopus, which could not be kept out by any means, and which soon cleared out the oysters.

In conchology, as a rule, there is not much humour running to waste, the subject not lending itself to hilarity, but one really humorous item is worth rescuing from oblivion. President John Craft, of the Alabama State Oyster Commission, started a crusade to preserve oysters from suffering the excruciating agony of being eaten alive, which he is sure they feel acutely, and he attempted to force a law through the Alabama Legislature making it a criminal offence to eat an oyster unless it has been humanely killed, and to rouse public opinion to his support. Hear the manifesto of this humanitarian gone astray :—

"Just because an oyster cannot yell and wriggle when its valves are torn violently asunder and it is cut from its base, to be then speared with a fork, sprinkled with salt, pepper and vinegar, that is no reason for concluding the oyster has no feeling. As a matter of fact it does feel pain, and it suffers dreadfully. All this could be avoided if the oyster were first slaughtered, quickly and mercifully, and brought to a peaceful end, without lessening its palatable nature in the least. In fact, a fresh oyster that has just died is better than one still alive, and this is explained by simple and well understood

natural laws. Both humane persons and those acquainted with food hygiene will agree with me in my crusade. I shall maintain the agitation until it is no longer a misery for the patient oyster to be swallowed alive. I expect to meet with ridicule at first, but in the end humanitarianism will win, as it always does."

Another convert to this heartrending doctrine is the American pure food expert Dr. Wiley, who depicts the oyster as undergoing agonies on the prongs of a fork and squirming under the stings of pepper and vinegar. He says that "ninety per cent. of the oysters are eaten alive, and suffer excruciating pain when jabbed with a fork and sprinkled with condiments."

But this lurid picture is controverted by the epicure, who would say that oysters are not jabbed with a fork nor made to smart with condiments, but are first treated with a squeeze of lemon and then swallowed whole from the shell; while the naturalist would aver that the pain, if any, would be only that caused by cutting the great adductor muscle which attaches it to the shell, and as this muscle contains no sensory nerves it cannot feel much, if anything.

According to scientists, indeed, the oyster is a callous animal and does not mind being eaten, but on the contrary views its approaching deglutition with the greatest equanimity, and may, therefore, be eaten by the most tender-hearted humanitarian without a single mental qualm, and this notwithstanding that Professor Huxley, a well-known authority on the oyster question, has said in one of his lectures:—"He did not wish to spoil their appreciation of the oyster, but every time they swallowed one of those delicate morsels they were appropriating to themselves a piece of mechanism which was vastly more delicate and complicated than the best repeater watch turned out of a modern factory."

After all, the ethics of the case have been well explained by Dr. Alfred Russel Wallace, in his valuable work on "The World of Life"—"The idea that every living thing thinks and feels and suffers in exactly the same way as a human being is a relic of barbarism. An oyster is a very low form of living being; its nervous system is next to nothing, and all talk about cruelty in eating it is the most utter nonsense." "Whatever a giant may feel when he dies, if the theory of evolution be true, the poor beetle that we tread upon certainly feels an irreducible minimum of pain, probably none at all."

There does not appear to be much connection, at first sight, between oysters and consumption, but recently the leading medical journal (*Lancet*, Oct., 18, 1912), described a treatment which has been carried out by MM. J. Carles and B. Laquet, the clinical results of which have proved highly satisfactory, and vastly preferable to the simple method of drinking sea-water (which is very nasty) recom-

mended by some doctors to increase the gastric juice in consumptives. It is alleged that six large oysters, impregnated with fresh sea-water, taken before a meal, in a few days bring about a manifest increase of appetite and an improved digestion. They have demonstrated this in a large number of patients by test meals, and they declare the oyster to be a tonic of the first order and of great benefit to weakened patients and those of deficient appetite.

It has long been known to some doctors that oysters, in addition to their food value, are of the greatest use in aiding the restoration to strength of convalescents, on account of their tonic action, and that they also form a valuable pabulum for the nervous system in cases of exhaustion. It is, therefore, unfortunate that this valuable remedy should be maintained at prohibitive prices, but also inevitable while the oyster, notwithstanding its extreme fecundity, has to contend with numerous enemies from the cradle to the grave. In the larval condition, when the larvæ are about 150th of an inch in diameter, there is hardly any animal in the sea too small to make a meal of it, and even later, when the shell is thickening but still soft, the oyster is the prey of innumerable fish, so that the amount of destruction from all causes is enormous.

The *O. cochlear* of Poli was dredged during the 'Porcupine' Expedition 40 miles off Valentia, in 110 fathoms.

Pecten islandicus var. **scotica** Simpson.¹—A dozen living specimens of this shell, about an inch in length, were taken by Mr. G. Sim, of Aberdeen, from a piece of coral brought in by one of the Aberdeen trawlers, who said he had trawled it 40 miles N.E. of the Flugga Light, in about 90 fathoms. Flugga is the most northerly lighthouse on the island of Unst in the Shetlands. Other examples of the same variety have been taken between the Orkneys and Shetlands in 145f., by Mr. J. Simpson, who has adopted the varietal name of *scotica* for this dwarf form. G. O. Sars gives the range of *P. islandicus* as "5—50 fathoms from Finmark to Bergen, where it becomes dwindled."

(To be continued).

¹ Notes on Rare Moll., *Journ. of Conch.*, 1910, vol. 13, p. 110; Trans. Aberdeen W.M. Nat. Hist. Soc., 1903, p. 66.

Activity of *Arion ater*.—A fine specimen of *Arion ater* of the white variety was taken on the Cartmel road, August 23rd, and placed in a box on the top of a book-case, four-and-a-half feet high. During the night it ate its way out, and at eight o'clock in the morning was seen crawling along the book-case, then on to the wall and all round the frame of a door, then under that door and under another, and was found after lunch under a window seat eleven feet from the last door. The total distance traversed is about thirty-eight feet. When found it was squeezed up tight, asleep, as if it had been there a long time.—MARGARET M. BLISS' (*Read before the Society*, Sept. 11th, 1912).

**ANCYLUS FLUVIATILIS var. GIBBOSA Bourg.
IN DERBYSHIRE.**

BY R. STANDEN.

(Read before the Society, November 13th, 1912).

A FEW white *Ancylus* were taken in Dove Dale, in October, 1910, by Mr. J. A. Hargreaves, of Scarborough. - On applying to him for particulars respecting the exact locality, all the information he could furnish was that he got them "amongst watercress." As both my friend, Mr. J. Kidson Taylor, and I were desirous to take this variety for our own collections from a Derbyshire locality, we determined, whilst I was on a visit to him during October last, to have a thorough search for it. Accordingly, taking an early train to Alsop-en-le-Dale, we walked through Mill Dale, and on entering Dove Dale proceeded along the river side until we came to a large watercress bed, which filled up a narrow, rather deep runnel of spring water, issuing from the mountain side, in close proximity to the River Dove, and about midway between Mill Dale and the famous rock pinnacles known as Tissington Spires. On tearing up and rolling back the thickly matted watercress, the clean limestone fragments, partially filling up the runnel, were seen to be covered with *Ancylus*, in all stages of growth, but full-grown shells were decidedly scarce, and a long and careful search was necessary to secure a decent set each. Both adult and young had the swollen shell, with beak over-hanging the posterior margin, which are the distinguishing characteristics of the variety *gibbosa*, and it was the recognition of this form that induced us to persevere in the endeavour to obtain a good set for ourselves and friends, for they showed no signs of being the white variety of which we were in quest, and otherwise we might have passed them by as of little consequence. About a mile further down the Dale we came across a very similar spring runnel, but in this case the outflow was more widely spread and shallow, and the uppermost stones were covered with a thick growth of *Fontinalis antipyretica*—a plant which I have noticed associated with *Ancylus* in many places. Here adult shells, of exactly the same type as at the previous locality, were abundant, whilst young individuals were scarce. In neither place was it possible to ascertain whether the shells occurred in the river itself, for it is rather deep and rapid at these points, but in all probability they do.

The shells, when seen on the stones, and also when gathered, appeared to be intensely black. This black colour, however, is entirely confined to the animal, and we were agreeably surprised, on

cleaning out the shells, to find them practically white, with—in the younger shells especially—a very pale diaphanous straw-yellow epidermis. The shells are of medium size, thin, though not particularly fragile, beautifully clean, semi-transparent, finely striate, and mostly free from the extraneous growths of microscopic algæ or other organisms which so often disfigure the shells of *Ancylus*, and there is little trace of the erosion of the beak by humic acids which is prevalent in many localities.

The muscle scar midway up the shell is unusually well defined, and presents the form of an irregular purple-black scroll, commencing with an oval blotch, and extending nearly round the inner circumference. This internal scroll shows up very vividly against the shining white interior, and is plainly visible through the thin shells on their dorsal surface—giving them an exceptionally curious appearance which at once attracts attention. Neither of us remembered having seen this peculiar mark before in any specimens we had collected, and none in Mr. Taylor's collection showed it. I have since examined my own series of *Ancylus*—which contains over forty locality sets, exhibiting great diversity in both external and internal colouration—and find that specimens from Malham Cove, and Airedale, bear a mark precisely similar to the Dove Dale examples, but it is much less plainly conspicuous exteriorly, owing to their greater thickness of shell.

Associated with the *Ancylus* were some small-sized, but extremely globular *Limnæa pereger*. Numbers of enormous specimens of *Arion ater*—some of them the largest individuals we have ever seen—were crawling over the watercress, together with a few small *Succinea putris*.

The variety *gibbosa* does not appear to have been hitherto recorded for Derbyshire, and this fact, coupled with its assuming a white form, and the presence of what seems an unusual and striking marking, merits, in my opinion, more than a passing notice.



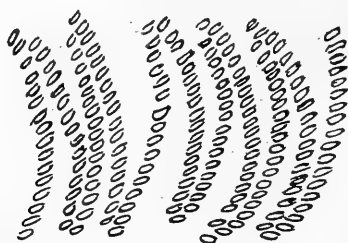
Testacella scutulum in Staffordshire.—I have now to record another new species of mollusca for our county, *Testacella scutulum*, having been identified by Mr. B. Bryan of the North Staffordshire Field Club Museum at Hanley, from specimens recently obtained in a garden at Fenton, in the new federated Borough of Stoke-on-Trent. The identity of the species has been confirmed by Mr. J. W. Taylor, to whom I submitted the four specimens found. Mr. Bryan tells me that the man from whom he received the slugs stated that he had seen many of them for some years past in the garden, and frequently found them crawling over the walks in the day-time, but he was ignorant what they really were until Mr. Bryan identified them as *T. scutulum*.—JOHN R. B. MASEFIELD (*Read before the Society*, Nov. 13th, 1912).

THE FEEDING TRACK OF OXYSTELE IMPERVIA Menke.

By KEPPEL H. BARNARD, B.A.

(Read before the Society, September 11th, 1912).

OBSERVATIONS on the feeding tracks of gasteropods are not numerous. L. E. Adams in the *Journal of Conchology* for July, 1912, has described the track of *Limax flavus* and B. B. Woodward ("Proc. Mal. Soc., vol. vii., no. 1, March, 1906) has recorded the track left by a slug on a bromide print and has enumerated the previous records. The following note on the tracks of *Oxystele impervia* Menke, a common Cape species, may therefore be interesting. The tracks were on the glass of an aquarium tank just below the water-line and showed



Portion of the feeding tract of *Oxystele impervia*, about natural size.

very plainly when the water was removed. They consisted of very regular series of alternate sweeps, each sweep being formed of 18 (on an average, the extremes were 14 and 22) individual "licks." The sweeps measured from 20–25 mm. in width and the licks 2 mm. by 1 mm. All efforts to obtain an "autograph" by inducing the animal to feed off the sensitised film of a photograph (see Woodward, *l.c.*) were failures. I hope to obtain the tracks of other species, e.g., the much larger *Oxystele tigrina* and *Turbo sarmaticus*.

Note on a Sinistral Specimen of *Marginella zonata* Kiener.—Whilst travelling in South Africa my friend, Mr. G. Butler, was endeavouring to procure some shells for me, and staying with some friends of his got a small parcel of shells picked up on the beach at Cape Town. On examining the shells I was agreeably surprised to find an immature sinistral specimen of *M. zonata*, other specimens of the type and var. were all dextral. A sinistral specimen of *M. apicina* Menke—var. *conoidalis* Kien.—is in the collection of Dr. J. Cosmo Melville, and sinistral forms of *M. glabella* L. have, I am informed, been reported.—B. R. LUCAS
(Read before the Society, March 12th, 1913).

CENSUS AUTHENTICATIONS.

BY W. DENISON ROEBUCK, HON. RECORDER.

[All the records here given are based upon examples sent to the official authenticators: myself for slugs only; Mr. Fred. Taylor for *Paludestrinidæ*; and Mr. John W. Taylor for all other species].

Co. Limerick: Mr. R. A. Phillips has submitted examples of *Paludestrina confusa* from both banks of the Shannon, near Limerick, taken in May 1910.

Co. Longford: We have now had the pleasure of seeing a number of species from this county, through the kindness of Mrs. Mackay Wilson, of Currygrane. From Currygrane Lough dead shells were submitted of *Limnea auricularia* var. *acuta* (one); *Planorbis albus* (a few); *P. umbilicatus* (two juv.); *P. contortus* (a few); *P. fontanus* (a few); *Bythinia tentaculata*, *Valvata piscinalis*, *V. cristata* (all three numerous); *Sphærium corneum* (three); *Pisidium fontinale* (several); and *Succinea elegans* (one, taken living). From Currygrane were *Vallonia pulchella* (a few); and *Cochlicopa lubrica* (three). All the above taken in 1899. Of more recent date, 22nd October, 1912, were single living examples of *Helix aspersa* and *Hygromia rufescens*.

Merionethshire: Mr. F. H. Sikes has submitted for authentication *Paludestrina jenkinsi*, taken by him at Arthog, September, 1910, also *Zonitoides nitidus* which he took at Llanbedr in 1910.

Norfolk East: Mr. Arthur Mayfield has submitted *Azeca tridens*, which occurred sparingly at Roydon, near Diss, July, 1900.

Northumberland South: Mr. A. M. Oliver has submitted an example of *Testacella scutulum*, taken in a greenhouse at Gosforth, where several have occurred. The specimen is preserved in the Hancock Museum at Newcastle, the gift of Mr. H. P. Angus.

Pembrokeshire: M. J. Davy Dean has submitted numerous examples of *Hygromia fusca*, collected at Pembroke by Mr. H. Brooksbank.

Queen's County: Mr. R. A. Phillips has added to his numerous authentications the following: *Vertigo pygmaea* (a few); *V. substriata* (one); *V. antivertigo* (a few); *Helicella caespitata* (a few); and *Agriolimax lævis* (one), all taken in July 1911, at Durrow; *Aplexa hypnorum* (a few), taken at Mountmellick, June 1911; *Helicella acuta* (two); and *Planorbis albus* (a few), both taken near Maryborough, October, 1910.

Radnorshire: Mr. J. Williams Vaughan has sent *Hygromia rufescens* from Skreen Darren, near Erwood Station, where, after rain, they sometimes abound.

Shetlands: Mr. William Evans sent me, in May 1911, a living example of *Limax maximus* var. *fasciata*, found in garden, Lochend, Lerwick. The Society's Voucher-Collection at Manchester contains: *Planorbis glaber*, a few from Flossie Loch; *Pl. contortus*, a few from Asta Loch; *Pl. crista*, one from Flossie Loch and a few from Asta Loch. These were all collected by Dr. Thomas Scott.

Co. Sligo: Mr. F. H. Sikes has submitted examples of *Acroloxus lacustris* var. *albida* from Sligo, taken in April 1908.

Suffolk East: Mr. Arthur Mayfield has submitted a few examples of *Testacella haliotidea*, taken during the first week of April, 1909. Mr. G. C. Leman has sent *Milax gagates* var. *rava*, an adult example taken 12th September 1912.

Sussex West: We have been enabled by the kindness of Mr. W. Cole, curator, and Mr. H. Whitehead, B.Sc., assistant curator of the Essex Museum at Stratford, to see examples of *Azeia tridens*, Newtimber (J. E. Harting); *Limnea glabra*, Cowfold (J. E. Harting). The Rev. W. A. Shaw has presented to the Society's Voucher-Collection *Pisidium cinereum* from a dried-up stream at Chidham, autumn of 1911.

Cornwall East: Mr. Alan Gardiner has sent a dead example of *Ena obscura*, taken at Pentire.

Flintshire: Mr. C. H. Moore has submitted a collection of shells made at Dyserth and St. Asaph. Four of them are new to the Census, viz: a few *Hyalinia pura* and one *Sphyradium edentulum* from St. Asaph, and a few *Limnea truncatula* and a single dirt-encrusted *L. peregra* from Dyserth. These last are the only freshwater shells as yet authenticated from Flintshire.

Galway South-East: On the 5th May, 1913, Mr. R. A. Phillips sent a single example of *Testacella haliotidea*, taken in a garden at Portumna, and with it, one of *T. scutulum* taken at the same time and place.

Herefordshire: Prof. A. E. Boycott has sent an immature example of *Planorbis corneus*, taken in April, 1913, at Hereford. In September, 1910, Mr. J. R. le B. Tomlin sent for authentication *Vallonia excentrica* from Whitbourne, and *Planorbis crista* var. *crista*, *Pl. fontanus* and *Pisidium subtruncatum*, all from Mathon, taken during that month.

Lancashire West: From Mr. J. Davy Dean we have received some young *Arion intermedius* from Caton, near Lancaster, taken 20th April, 1913.

Westmorland with Lake Lancashire: Mr. J. Davy Dean has submitted examples of *Ceciloides acicula*, taken in 1912 at Arnside Knot. Mr. A. W. Rymer Roberts has submitted two very small examples of *Acroloxus lacustris* from White Cross Bay, Windermere. Mr. J. Wilfrid Jackson, F.G.S. has submitted two *Planorbis umbilicatus* and a dead *Bythinia tentaculata*, taken at Hale Moss. Mr. J. Davy Dean and Rev. C. E. Y. Kendall found *Pupa anglica* at Sawrey, by Windermere, in October, 1912, and sent up a few for authentication.

Surrey: The Rev. W. A. Shaw has submitted the following.—*Hygromia fusca*, scarce on the way to Hindhead, 25th November, 1911; *Balea perversa*, from a rockery at Witley, February, 1911; *Acicula lineata*, from marsh, near Godalming, 23rd March, 1910; *Amphipeplea glutinosa*, near Weybridge, September, 1911. The specimens have all been kindly presented to the Society's Voucher-Collection.

Co. Waterford: Mr. R. A. Phillips has submitted *Paludetrina confusa*, taken abundantly at Kilbarry Marsh, near Waterford, 16th May, 1910.

Co. Westmeath: Mr. G. P. Farran has been good enough to let our authenticator see the following.—*Helicigona arbustorum*, type, one; *Zonitoides nitidus*, abundant; *Hyalinia radiatula*, one type and one var. *viridescens-alba*; *Planorbis crista*, several, and *Acroloxus lacustris*, several, small, all from Multyfarnham; *Amphipeplea glutinosa*, one, and *Aplexa hypnorum*, a few, both from Lake Derrevaragh, 15th May, 1897; *Succinea putris*, two, small, from bog near Lacken; and *Clausilia laminata*, several from Ilare Island, Lough Ree.

Co. Wexford: Mr. R. A. Phillips has submitted one specimen each of *Limnea stagnalis* and *Pisidium amnicum*, taken at Enniscorthy, 8th July, 1911; also an example of *Milax gagates*, taken at Killurin, 9th April, 1912.

Wilts. North: Mr. C. N. Bromhead, of the Geological Survey, has sent a fine example of *Helix pomatia* from Puthall Gate, Savernake Forest. Mr. Cecil P. Hunt also sent a large number of fine examples from Ramsbury, where the species occurs plentifully on a wooded chalk slope.

NOTES ON SOME PLEISTOCENE MOLLUSCA IN NORTH HUNTINGDONSHIRE.

BY REV. C. E. Y. KENDALL, B.A.

(Read before the Society, March 12th, 1913).

At Woodston, in North Huntingdonshire, are many large brick-works which find their material in that vast bed of Oxford Clay which lies to the south of the River Nene at Peterborough. During the work of excavation some little time ago the "steam-navvy" exposed in one of these workings a section of an ancient river or lake bed, which has been described locally as the Buried River. This so-called Buried River traverses the beds of Oxford Clay for some considerable distance in a direction roughly from north-west to south-east, as borings made in the neighbourhood have shown, but its actual area and boundaries remain at present undefined. The bed of the river (or lake) lies roughly at a depth of 40 to 50 feet below the existing level of the land and consists at the bottom of a mass, many feet in thickness, of rubble and boulders lying in and through the "knotts" as the brick-clay is termed locally. The actual ancient water-space is filled in with a variety of sands, marls, clays and gravels which will be described in detail later on, these forming a mass roughly from 25 to 30 feet in thickness. As the material which has filled in the old bed is useless for the making of bricks, fresh workings have been opened up in the solid Oxford Clay beyond its limits and the exposed faces of two sections of the old bed remain in an ideal condition for geological investigation.

My own researches into the contents of the marls in this ancient river-bed were made in the first place for the purpose of establishing some data as to the probable climatic conditions in the days when the deposit was laid down, and also as to the probable origin of the deposit, whether fluvial or lacustrine. But the results have been so surprising from a conchological point of view that I have been amply rewarded for a good deal of somewhat laborious work and have collected certain facts which will, I believe, be of very considerable interest to my fellow conchologists. For this deposit has afforded me up to the present time 53 species of the non-marine mollusca, of which 28 are terrestrial species and 25 fresh-water species, giving a most unusual proportion of the land-shells. Moreover of the species found in this deposit no less than seven are now extinct in the British Isles, and of these one—a *Paludestrina*—appears to be new to science. Of the others *Clausilia ventricosa* Drap. and *Cl. parvula* Stud. have

not hitherto been recorded in Britain, and *Helicella candidula* Studer, though noticed as a Pleistocene aberration from the modern form of *Helicella caperata* Montagu, has not been up to the present referred to this continental species. Again two of our present day species which occur in great numbers throughout the deposit, *Hygromia hispida* and *Cochlicopa lubrica*, show a very marked difference in size, enabling one to realize the fact of the decadence in later times of certain weaker species, once perhaps dominants, before the advance of the modern dominant types.

The deposit at Woodston is, as mentioned above, of a very considerable depth and the source of its origin is apparently three-fold. The lowest strata, which lie directly above the mass of rubble, consist of a light-coloured, yellowish, sandy marl, stiffening in places to a marly clay and containing here and there patches or pockets of a black peaty silt. These strata are full of land and fresh-water shells and are quite evidently of a fluviatile or lacustrine origin. This lowest bed, containing the shells, is from four to five feet in thickness. Above this lies an even horizontal bed of a stiff dark clay, almost black in colour and about three feet in thickness. This bed contains a species of *Paludetrina* in great abundance, with a few fresh-water shells, *Limnæa* and *Planorbis*, a few immature *Hygromia*, and a good number of valves of *Cardium edule*. This portion of the deposit I take to be of estuarine origin; and Mr. A. S. Kennard informs me that this bed of estuarine clay may possibly be the local equivalent to the Buttery Clays which to the south and east underlie the great peat deposits of the Fens. Then again above this estuarine or *Paludetrina* Bed lie strata of marine sands and gravels twelve to fifteen feet in thickness, from which at present I have taken but one species of marine shell—*Scrobicularia plana*.

There can be no doubt, therefore, of the great age of the shell deposit in the lower strata, for evidently at some period the sea has buried the whole district, and I incline to think that we have here the bed of a lake existent in early glacial times. For the molluscan fauna is on the whole of a definitely Arctic type, very much akin to the Scandinavian fauna of to-day and no traces whatever have been found so far of either *Ancylus* or *Neritina*, such genera as one would certainly expect to occur in a river deposit. Moreover the old bed of the River Nene (containing undoubted species of the Pleistocene period) can be traced less than a mile away to the north, and one can hardly conceive of two rivers, of such magnitude as their ancient beds suggest, existing, so to speak, side by side. Perhaps in time as fresh portions of this Buried Lake-bed are opened up in the working of the clay in the immediate neighbourhood, we may discover the

solution of this and other points.¹ So remembering that we are here just outside the limits of the great ice-sheet which in the glacial age over-spread the north and midlands, I hold on the present evidence that this deposit is of lacustrine origin, laid down in a lake of some considerable extent of the Pleistocene period, perhaps formed and fed by the glacial streams of the great Ice Age.

§ 1.—THE CONTENTS OF THE SHELL-DEPOSIT.

A.—THE TERRESTRIAL SPECIES.

I propose to group these species under three heads—I. Those which are of a distinctly Boreal type, whose range to-day is more or less confined to the sub-Arctic region. II. Those which, while not so definitely Arctic, are still of a somewhat northerly range. III. Those species which have a more southerly range.

I.—DEFINITELY BOREAL SPECIES.

<i>Pyramidula ruderata</i> Studer	Abundant and very fine.
<i>Acanthinula aculeata</i> Müller	Plentiful.
<i>Vertigo minutissima</i> Hartmann	} Most of the Vertiginidæ are present in considerable numbers.
<i>V. antivertigo</i> Drap.	
<i>V. pygmæa</i> Drap.	
<i>V. pusilla</i> Müller	
<i>V. angustior</i> Jeff.	
<i>Clausilia ventricosa</i> Drap.	Two specimens.
<i>Cl. pumila</i> Ziegler	Abundant.

II.—SPECIES WITH A NORTHERLY RANGE.

<i>Vitrea crystallina</i> Müller	Plentiful.
<i>V. nitidula</i> Drap.	Scarce.
<i>Punctum pygmæum</i> Drap.	Abundant.
<i>Pyramidula rotundata</i> Müller	Abundant.
<i>Hygromia hispida</i> L.	Very abundant.
<i>Vallonia pulchella</i> Müller	Very abundant.
<i>V. costata</i> Müller	Very abundant.
<i>Helicigona arbustorum</i> L.	Scarce.
<i>Cochlicopa lubrica</i> Müller, and var. <i>lubricoides</i> Férussac	} Very abundant.
<i>Azeca tridens</i> Pulteney	
<i>Pupa muscorum</i> L.	Comparatively scarce.
<i>Carychium minimum</i> Müller	Very abundant.

¹ The workman who did the borings in the neighbourhood to find the general extent of this Buried Lake informs us that in several places the deposit underlies patches of Boulder Clay. This fact is of great interest and importance and we hope to have confirmation of it, which would establish beyond question the actual age of the deposit.

III.—SPECIES WITH A MORE SOUTHERLY RANGE.

<i>Helicella candidula</i> Studer	Frequent
<i>Helix nemoralis</i> L.	Abundant.
<i>Ena montana</i> Drap.	Two specimens.
<i>Clausilia parvula</i> Stud.	One specimen.

B.—MARSH-LAND SPECIES.

(a) Fresh-water Marsh.

<i>Zonitoides nitidus</i> Müller	Frequent.
<i>Succinea elegans</i> Risso	Abundant.
<i>S. oblonga</i> Drap.	Two specimens.
<i>Limnæa truncatula</i> Müller	Plentiful.

(b) Salt Marsh.

<i>Paludestrina deani</i> sp. nov.	Very abundant.
<i>Cardium edule</i> L.	Plentiful.

C.—FRESH-WATER SPECIES.

Among these the shallow-water species predominate. For instance we have no less than six species of the genus *Planorbis* and with them *Bithynia tentaculata* which is by far the most abundant of the fresh-water shells obtained from the deposit. It is worthy of note that the *Pisidia* are exceedingly scarce.

<i>Limnæa auricularia</i> L.	Somewhat scarce.
<i>L. pereger</i> Müller	Scarce.
<i>L. palustris</i> Müller	Plentiful.
<i>L. stagnalis</i> L.	Many fragments.
<i>Planorbis albus</i> Müller	Scarce.
<i>P. glaber</i> Jeff.	Frequent.
<i>P. crista</i> L.	Plentiful.
<i>P. carinatus</i> Müller	Plentiful.
<i>P. vortex</i> L.	Scarce.
<i>P. spirorbis</i> Müller	Very abundant.
<i>Physa fontinalis</i> L.	One half-grown shell.
<i>Aplecta hypnorum</i> L.	Fragments only.
<i>Bithynia tentaculata</i> Müller	Very abundant.
<i>Valvata piscinalis</i> Müller	Abundant.
<i>V. macrostoma</i> Steenbuch	One specimen.
<i>V. cristata</i> Müller	Plentiful.
<i>Unio littoralis</i> Lamarck	Plentiful.
<i>Sphærium corneum</i> L.	Scarce.
<i>Pisidium amnicum</i> Müller	Scarce.
<i>P. henstowianum</i> Sheppard	Very scarce.
<i>P. pusillum</i> Gmelin	Scarce.
<i>P. personatum</i> Malm	Scarce.
<i>P. casertanum</i> Poli	Scarce.

§ 2.—The species still found living in the British Isles and contained in the above lists which seem to call for some special remark are the following:—

1. **Hygromia hispida** L.

This shell which occurs in great numbers in the deposit at Woodston is the large, widely umbilicate form of British Pleistocene deposits, the shells measuring 6·48 mm. in height and 10·59 mm. in width. Some recent Derbyshire specimens of this form—var. *concinna* Jeff.—have a height of 5·23 mm. and a width of 8·87 mm., and the difference in the robust and compact growth of the fossil shells is a most noticeable feature. We have here undoubtedly the ancestral type of *H. hispida*. This extreme size in this species is especially remarkable, for Scandinavian shells, which we have had the opportunity of measuring, only give measurements of 4·75 mm. in altitude and 7·46 mm. in width, and shells from the English Lake District are very seldom any larger than this.

2. **Ena montana** Drap.

The one perfect specimen which I have so far found at Woodston is a good typical shell measuring 13·5 mm. in length. It is an interesting record which suggests that the range of this species may at one time have been considerably more extensive than it is to-day. *Ena montana* appears to be of very rare occurrence in the British fossil deposits. Mr. A. S. Kennard informs me that hitherto it has only been found in the deposits at Barnwell and Grantchester in Cambridge, and at Clacton in Essex, of Pleistocene age and in these places but sparingly.

3. **Cochlicopa lubrica** Müller.

The shells of this species from the Woodston deposit are about a third as large again as the present British type and measure 7·63 mm. in length with a width of 3·24 mm. in the type, and of 2·7 mm. in the variety *lubricoides*. Both forms are extremely common in the deposit. Mr. A. S. Kennard tells me that this species as well as *Hygromia hispida* are very frequently of a large size in the Pleistocene deposits. Recent specimens from Vermland in Sweden do not measure more than 5 mm., while British specimens on an average give 5 to 6 mm. in length.

4. **Valvata macrostoma** Steenbuch.

I have so far only found one specimen of this shell in the deposit, but it is quite a typical one of a species which cannot possibly be confused with *Valvata piscinalis* Müller. Owing to its recent discovery living, at Lewes, in East Sussex, a good deal of interest now centres in this species. Its occurrence in the Pleistocene deposits at Clacton and Barrington, and now at Woodston suggests that it is one

of those species which are gradually disappearing and survive only under some favourable conditions in a few isolated localities.

§ 3.—SPECIES EXTINCT IN BRITAIN.

1. *Pyramidula ruderata* Studer.

A large number of shells of this distinctively Boreal species is found in the deposit at Woodston, and they are on the whole very fine examples, the best measurements being 6.35 mm. diameter and 3 mm. altitude. *Pyramidula ruderata* is very generally considered to be now extinct in the British Isles, and is always rare in fossil deposits. Mr. J. W. Jackson has also recently recorded its occurrence in Cave Earth near Carnforth in North Lancashire, probably of late Pleistocene origin (*vide* "The Lancashire Naturalist," December, 1909). In his "Monograph of the British Land and Fresh-water Mollusca" Mr. J. W. Taylor gives the range of *P. ruderata* to-day as circum-polar, stretching from Sweden throughout Central and Eastern Europe and Siberia across to Alaska and California.

2. *Helicella (Candidula) candidula* Studer.¹

"Narrowly umbilicated, minutely striate, whitish, unicoloured or variously banded with brown; whorls 4½-5, slightly convex, the last scarcely deflected in front; peristome acute, internally thickened. Diam. 9 mill."

Description from Tryon, "Manual of Conchology," who figures the species and gives its habitat as "Middle Europe."

In the Woodston deposit are found a number of small *Helicellæ* of a form which has been noticed in British Pleistocene deposits and been described in the lists as *Helicella caperata* Mont. Mr. A. S. Kennard, by whom the Woodston shells have been very carefully examined, now admits that *H. candidula* Studer is the nearest species to them, and to similar shells in his collection from other Pleistocene deposits. They are certainly not the *H. caperata* of Montagu, being much more compact and globose. Thanks to the kindness of Mr. Edward Collier we have had the opportunity of comparing them with a number of recent European specimens. Mr. J. D. Dean who has examined these shells for me considers the British form as more nearly referable to the var. *alpicola* Stab. than to the type. In this the whorls are more compressed, the base of the shell flatter, and the umbilicus rather more open. Tryon thus describes this variety:—

"Var. *alpicola* Stabile

"Small, cretaceous, globosely depressed, rather thin, with narrow, pale, interrupted bands, evanescent, aperture more rounded. Diam., 6.5 mill."

¹ According to Westerlund, synonymous with *Helicella unifasciata* Poir.

We think, therefore, we may safely adopt this identification. There is a slight difference in size but when we remember the protean nature of this group of shells, the mere fact that the Pleistocene form is rather smaller than recent European examples seems a matter of very little importance. Mr. Collier's specimens of the var. *alpicola* from the Tyrol measure 4 mm. in height and 6.08 to 6.27 mm. in diameter. The Woodston fossils give—altitude 3.31 mm., diameter 5.86 mm. Mr. Kennard has kindly sent me specimens from the Pleistocene deposits at Crayford in Kent, and Barnwell, near Cambridge, which both Mr. Dean and myself find similar in all respects to the Woodston shells. The habitat of this species to-day is Switzerland, the Tyrolean Alps, France, S. Germany, and N. Italy.

3. *Clausilia (Pirostoma) ventricosa* Draparnaud.

So far two specimens of this northern species have occurred in the Woodston deposit. Unfortunately owing to their slender build the *Clausiliae* seem the most fragile of shells, though fragments of them, especially the apices, are extremely plentiful. I have only been able to obtain about ten perfect specimens of the genus, but I hope that further search may result in a few more perfect examples being added to those which I have already collected. This species was named for me by Mr. J. D. Dean, by comparison with some recent examples in his collection obtained from the Kinnekulle Mountains in Southern Sweden (see *Journ. of Conch.*, vol. xiii., p. 356) with which the fossil shells are absolutely identical. This identification has since been confirmed by Mr. Kennard, so I have no hesitation in claiming for this species a place in the British List.

Clausilia ventricosa Drap. is an exceedingly handsome shell, the finest of the *Pirostoma* section of the genus. Its range according to Westerlund is throughout North and Mid-Europe.

The finest of the fossil shells from Woodston is 15 mm. in altitude and 4.23 mm. in diameter.

4. *Clausilia (Pirostoma) parvula* Studer.

Although so far only one specimen has occurred, this is quite perfect, and the record is important as still further showing the western range in Pleistocene times of the genus *Pirostoma*. In this connection it should be noted that there is absent from these lists altogether the familiar *bidentata* Ström. of the present day, its nearest ally. *Clausilia parvula* is, however, a well-known continental species with a wide range throughout Alpine Europe, and is a familiar member of the Swiss fauna. Length 11 mm.

5. *Clausilia (Pirostoma) pumila* Ziegler.

This interesting species occurs in considerable numbers in the deposit at Woodston. It is extinct in Britain but has been recorded

by Mr. B. B. Woodward as fairly common in the gravels of Pleistocene age at Barnwell in the neighbouring county of Cambridge (Proc. Geological Association, vol. x., no. 7). Its range to-day is throughout Northern and Central Europe, and it has been recorded from Sweden, Denmark, Livonia, Germany, Switzerland, Silesia, Carinthia, Croatia and the Tyrol. The measurements given above of *C. pumila* are those of A. Schmidt. The fossil shells from Woodston measure 11.86 mm. in altitude and 3.45 mm. in diameter.

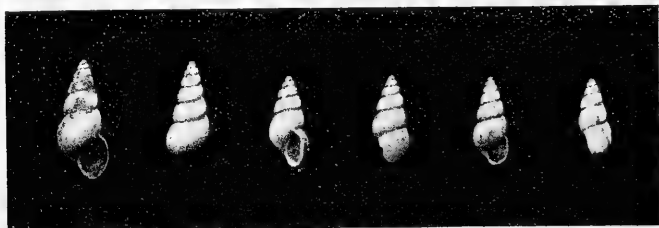
6. *Paludestrina deani* sp. nov.

Shell cylindrically conic; whorls six, rounded with coarse, irregular and somewhat indistinct striae, slightly truncate at the suture; suture deep; apex sharp; aperture oval, narrow; inner lip slightly reflected; umbilical cleft narrow, almost concealed.

Altitude 8.45 mm. Diameter 3.86 mm.

Horizon: Woodston, Huntingdonshire, in marls and clays of Pleistocene age.

This shell, though closely allied to *Paludestrina ventrosa* Montagu, of which we at first regarded it as an extreme form, seems to possess characteristics sufficient to separate it specifically. All our leading conchologists to whom I have submitted specimens unite in declaring it to be an entirely new species, quite distinguishable from the other members of the genus. It occurs in the greatest profusion throughout the three-feet thick deposit of dark estuarine clay which lies just above the shell-bearing lacustrine marls, along with many valves of *Cardium edule* and small numbers of *Limnaea pereger*, *Planorbis spirorbis* and immature *Hygromia*. It also occurs, but not nearly so plentifully, in the lower marls. It was evidently as abundant in this Pleistocene estuary as *Paludestrina stagnalis* Baster is to-day in many similar habitats.



Paludestrina deani n.sp. $\times 2$.

Types in the Manchester Museum.

Photo. by J. Wilfrid Jackson.

I have great pleasure in being permitted to give to this shell the specific name of *deani*, as a mark of deep gratitude to Mr. John Davy Dean, of Lancaster, one of the most accurate and painstaking of our younger conchologists, who first introduced me to the study of con-

chology, and who has been for a period of years consistently my guide, philosopher and friend in matters conchological, and the more justly so as he was the first to point out to me that this shell was quite distinct from all the known British *Paludestrinidæ*.

7. *Unio littoralis* Lamarck.

This large bivalve occurs frequently in the deposit in a more or less fragmentary condition, coming out in large scales of fragile, bright pearly material. Unfortunately my trowel pierced right through the two perfect specimens which I have met with, but the marl held the fragments together sufficiently for me to identify the species. It is of frequent occurrence in British Pleistocene deposits. In the immediate neighbourhood it was recorded many years ago by Dr. H. Porter, F.G.S., of this city from the Pleistocene gravels of the old Nene River, who figures it in his book "The Geology of Peterborough," published in 1861.

My best thanks are due to Mr. J. D. Dean for a large amount of help in separating out the species in the first place and also for the measurements given in this paper, also to Mr. A. S. Kennard for the final determination of the species; his extensive knowledge of British Pleistocene forms has made his help and kind advice absolutely invaluable. I have also to thank Mr. B. B. Woodward who kindly separated out and named the *Pisidia* for me, also Mr. Roebuck and Mr. Tomlin for their consistently kind advice and aid, and Mr. Edward Collier for the loan of a number of continental *Helicella* which have materially assisted in the identification of the *Helicella* found in the deposit.



Vertigo substriata in Guernsey.—The discovery of *Vertigo substriata* in the Channel Islands materially extends its range, and renders it all the more probable that it will be found in some of the southern counties where it has not yet been detected. The locality where it occurs in Guernsey is a marshy spot on the cliffs at St. Martin's, where a little rivulet runs down the cliffside through a small patch of loose stones interspersed with vegetation—perhaps a dozen yards long and half as wide. The slope of the ground prevents the stones from being entirely submerged even in wet seasons, and the place is never quite dry in summer time. It must be now some twenty years since I discovered that this little marshy spot was the home of *Pupa anglica* and *Vertigo antivertigo*, both of which species occur there in great profusion. During a visit to Guernsey last August I took my son to this spot to get these two species, and it was while collecting them that we found *V. substriata*. Curiously enough, although the marsh is very small, this minute shell seems to be restricted to one part of it, but there it occurs quite plentifully under the wet stones. I am indebted to Mr. J. E. Cooper for kindly examining specimens, and confirming the name. I may just mention incidentally that in the same marsh, among the stones, may be taken in numbers one of the very rarest of British spiders, *Salticus formicarius*, which closely resembles an ant.—E. D. MARQUAND (*Read before the Society*, Nov. 13th, 1912).

PERFECT ALBINISM IN LIMAX ARBORUM Bouch.-Chant.

By W. DENISON ROEBUCK, F.L.S.

(Read before the Society, September 11th, 1912).

ON THE 27th day of August, 1912, Mr. Charles Oldham, in company with Mr. Lionel E. Adams, found an albino example of the Tree-slug on a beech tree in the woods near Berkhamsted, Herts. He sent it to me the following day, and I showed it at the next meeting of the Conchological Society. It is the most perfect example of albinism in slugs that I have ever seen. It was entirely and absolutely without external pigmentation, not even the eye-specks being coloured. The only colour visible is that of the internal organs seen through the skin, and the apparent very pale grey shade with white mottlings on the sides of the body is merely the transparency of the skin and not due in any way to pigmentation. The specimen was not quite adult, and is now preserved in alcohol in the Conchological Society's voucher-collection.

The only previous examples we have seen were those taken near the Botanic Garden, Old Aberdeen, by Mr. Geo. Sim and which Mr. Taylor described ("Monograph," part 12, vol. 2, p. 274) as var. *alba* Taylor, animal entirely creamy-white, except the black eye-specks, no trace whatever of body or mantle-markings, but the dark internal organs are dimly visible through the skin.

The present example is clearly not referable to this variety—which has pigmentation in the eye-specks. It is, therefore, necessary to describe it as a new variety, thus :

***Limax arborum* var. nov. *albinos* Roebuck.**

Animal entirely white, absolutely without external pigmentation, only the dark internal organs showing faintly through the transparent portions of the skin.

It will be of interest to note that on the 14th September, at Grange-over-Sands (in v.c. 69, Westmorland-with-Lake-Lancashire), Mr. Fred. Rhodes took a fine adult example of *Arion ater* var. *alba* sub-var. *simplex*, which was the nearest approach I have seen to perfect albinism in that species—even the foot-fringe being white and not yellow as commonly found. But the eye-specks were coloured and there was the faintest tinge of pale grey on what might be termed the vertex of the mantle.



PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN & IRELAND.

420th Meeting, held in Manchester Museum, March 12th, 1913.

Mr. E. Collier in the chair.

Additions to the Library announced and thanks voted :

"The Conchologist" (1834), by John Warren ; "The Genera Vermium exemplified by various specimens of the Animals contained in the Orders of the Intestina et Mollusca Linnæi" (1783), by James Barbut ; "Die Conchylien, Seesterne und Meergewachse, der ehemaligen Gottwaldtischen Naturaliensammlung, &c." (1782), by Johann Samuel Schröter (presented by W. Ruskin Butterfield) ; and the usual periodicals received in exchange.

Donations to the Cabinet announced and thanks voted :

From Mr. J. R. le B. Tomlin—*Helix nemoralis* var. *carnea* (123)(45), *conica*, *Helicella caperata*, *Hygromia revelata*, *Pyramidula rotundata*, *Pupa cylindracea*, *Helicella acuta*, *Balea perversa*, *Succinea elegans*, *Limnea peregra*, *Planorbis spirorbis*, *Pisidium pusillum*, all from Tresco Island, Scilly, June, 1912.

From Mr. Charles Upton—*Sphærium pallidum* from Gloucester and Berkeley Canal, 1½ miles from Gloucester Dock (Gloucester East).

From Mr. W. Denison Roebuck—*Helicodonta obvoluta*, Buriton escarpment, Hants. S., July, 1912.

From Mr. E. D. Marquand—*Vertigo substriata*, St. Martin's, Guernsey.

Candidates proposed for Membership.

Major Matthew Connolly, c/o. Cox & Co., 16, Charing Cross, London, S.W., (by J. R. le B. Tomlin and J. Wilfrid Jackson).

Harry Leon Gauntlett, M.R.C.S. (Eng.), L.R.C.P. (Lond.), A.K.C. (Lond.), Member of Selborne Society, Merton Cottage, Bloxham, Oxon. (by E. Collier and L. J. Shackleford).

Julius Heller, Villa Gisela, Teplitz, Bohemia (by Dr. H. Becker and L. J. Shackleford).

Papers Read.

"Notes on Some Types of *Marginella* in the Mañrat Collection," by J. R. le B. Tomlin, M.A.

"Description of a New Species of *Adeorbis*," by J. R. le B. Tomlin, M.A.

"Descriptions of New Species of *Marginella* and *Mucronalia* from São Thomé," by J. R. le B. Tomlin, M.A. and L. J. Shackleford.

"Note on a sinistral specimen of *Marginella zonata* Kien.," by B. R. Lucas.

"An apparent selection of forms of *H. nemoralis* by adverse conditions," by Professor A. E. Boycott.

"On the Pennant Collection of British Shells," by Edgar A. Smith, I.S.O.

"*Paludestrina jenkinsi* in Cambridgeshire," by C. Oldham.

"*Helix aspersa* m. *scalariforme* Taylor," by J. R. B. Masefield, M.A.

"Notes on some Pleistocene Mollusca in North Hunts.," by Rev. C. E. V. Kendall, B.A.

"*Helix*—Section *Tachea* and their Geographical Distribution," by E. Collier.

Exhibits.

By Mr. W. Denison Roebuck : A living example of *Testacella maugei* var. *griseo-nigrescens* sent from Hereford by Miss M. A. Boycott.

By Mr. J. Davy Dean: A series of European shells for comparison with the Pleistocene species shown in illustration of Mr. Kendall's paper; also *Clausilia cravenensis* Taylor, a double-mouthed specimen from near Gargrave, Yorks.; also clausia of the *Pirotoma* section illustrating the specific differences between *bidentata* Ström, *plicatula* Drap., *dubia* Drap., and *cravenensis* Taylor.

By Prof. A. E. Boycott: Typical examples of the colour and band formulæ of *Helix nemoralis* from Land's End, Cornwall, to illustrate his note.

By Mr. R. Standen: Sections of *Clausilia biplicata* (Mont.), and *C. yokohamensis* Crosse, showing difference in attachment of the clausium.

By Mr. J. Wilfrid Jackson: Recent and Fossil examples of *Paludestrina stagnalis* (ulvæ) and *P. ventrosa* from several localities, for comparison, with the new *Paludestrina deani* from the Pleistocene of Woodston, N. Hunts.

421st Meeting, held in Manchester Museum, April 12th, 1913.

By invitation of the Manchester and district members, the members of the Leeds Conchological Club attended. Amongst those present were:—Mr. E. Collier (in the chair), and Messrs. J. W. Taylor, W. D. Roebuck, W. Cash, T. Castle, J. E. Crowther, F. Rhodes, A. Hartley, H. L. Stevenson, S. Fyscher, J. D. Firth, C. T. Cribb, J. F. Musham, J. H. Lumb, J. W. Brook, F. Booth, R. Standen, J. W. Jackson, B. R. Lucas, G. C. Spence, H. Allan, F. Taylor, J. D. Dean, E. Stump, C. H. Moore, W. H. Western, G. H. Taylor, W. Moss, Ford, Mrs. James, Mrs. Gill, and the Secretary.

Mr. R. Standen gave an interesting address on "The Eggs of Mollusca," urging the importance and interest of a greatly neglected study.

Mr. J. E. Crowther embodied the results of observations extending over several years in a paper on "The Distribution and Dispersal of *Sphaerium pallidum* in Halifax Parish, with Notes on Reproduction."

The Librarian reported that the usual periodicals and exchanges had been received, and thanks were voted.

A special vote of thanks was passed to Mr. A. J. Jukes-Browne, F.G.S., for his gift of Perry's Conchology to the Society's Library.

Donations to Cabinet announced and thanks voted:—

By Mr. J. F. Musham: A large series of *Littorina littorea*; shells polished to show extreme variation in banding.

By Mr. W. D. Roebuck: Specimens of *Acicula lineata* and *Vertigo pygmæa* for the Voucher Collection, from Shirwell, Barnstaple (Coll. C. Chichester).

New Members Elected.

Major Matthew Connolly, c/o Cox and Co., 16, Charing Cross, London, S.W.

Harry Leon Gauntlett, M.R.C.S. (Eng.), I.R.C.P. (Lond.), A.K.C. (Lond.), Member of the Selborne Society, Merton Cottage, Bloxham, Oxon.

Julius Heller, Villa Gisela, Teplitz, Bohemia.

Candidates Proposed for Membership.

William F. Clapp, 25, Ware Street, Cambridge, Mass., U.S.A. (by Chas. W. Johnson and Francis N. Balch).

Eugene W. Presbrey, 17, Trinity Place, New Rochelle, N.Y., U.S.A. (by L. J. Shackleford and E. Collier).

W. J. Davey, 19, Allfarthing Lane, Wandsworth Common, S.W. (by J. C. Dacie and James E. Cooper).

Norman Egbert Pellon, 60, Sampson Road, Sparkbrook, Birmingham (by Albert Wood and L. J. Shackleford).

Exhibits.

By Rev. Canon Horsley : A number of living *Testacella haliotide* and its var. *flavescens* from his garden at Detling Vicarage, near Maidstone.

By Mr. Edward Collier : Fifty species of *Alycaeus*.

By Mrs. A. Gill : Many species of *Amphidromus* and *Ancillaria*.

By Mr. J. E. Crowther : A fine series of *Sphaerium pallidum*, in various stages of development, to illustrate his paper.

By Mr. J. W. Jackson : Sets of *Sphaerium pallidum*, many being "historic" specimens, chiefly from Lancashire localities.

By Mr. C. T. Cribb : Reversed *Helix aspersa* from Devon ; *Limnaea glabra* from Appleby.

By Mr. J. Kidson Taylor : A fine series of species and varieties illustrating the numerous colour mutations occurring in the *Syndromus* section of *Amphidromus*.

By Mr. R. Standen : Calcareous eggs of forty species of British and exotic terrestrial mollusca, accompanied in some cases by the embryonic shells.

By Mr. W. Moss : Eggs of *Borus oblongus* showing development of embryonic shell.

By Mr. C. H. Moore : Land and freshwater shells from Dyserth, N. Wales.

By Mr. G. C. Spence : *Panda falconeri*, *P. larryi*, *Megaspira elatior*, *Pedino-gyra cunninghami*, and other interesting species.

By Mr. J. F. Musham : Locality sets of *Helix nemoralis* and *H. arbustorum*, and *Cecilioides acicula* from Barkby, East Riding of Yorkshire.

From the Cabinets of the Museum many drawers of choice shells were on exhibition, including *Helicostyla*, *Papuina*, *Acavus*, *Harpa*, marine shells from Tasmania and Vancouver, and a fine series of European *Helicidae*, and exotic *Limnaeidae* from the "Darbishire" Collection. The shell gallery of the Museum was also open for inspection.

422nd Meeting, held at Manchester Museum, May 21st, 1913.

Mr. E. Collier in the chair.

Additions to the Library announced and thanks voted :

"Further Records of the *Cephalopoda Dibranchiata* of the Coasts of Ireland," by Anne L. Massy. "On the Former Range of *Pomatias elegans* in the Warton District," by J. Wilfrid Jackson. "Fauna of the Gatun Formation, Isthmus of Panama," II., by Amos P. Brown and H. A. Pilsbry. "On *Hygromia rufescens* Auct., in Ireland," by A. W. Stelfox (*from the respective authors*) ; and the usual periodicals received in exchange.

Donations to the Cabinet announced and thanks voted :

For the Voucher Collection (per the Hon. Recorder) : *Punctum pygmaeum*, sandhills near Alnmouth, Cheviotland, and *Azeca tridens* var. *nouletiana*, near Lipwood House, Haydon Bridge, Northumberland South, from Mr. A. M. Oliver. *Cecilioides acicula*, Arnside Knot, Westmorland, from Mr. J. Davy Dean. *Testacella maugei*, The Grange, Hereford, from Miss M. A. Boycott—a particularly large example, which has been beautifully preserved by Mr. R. Standen.

The Secretary reported that portraits of Lieut.-Col. H. H. Godwin-Austen and the Rev. Canon J. W. Horsley had been presented for the Society's Collection of Past Presidents, and thanks were voted.

It was announced that, at Mr. Tomlin's suggestion, it had been decided to procure an Album for the preservation of Autograph Letters of eminent conchologists, and members who may have such letters that they can spare are urged to place them in the keeping of the Hon. Librarian.

New Members Elected.

William F. Clapp, 25, Ware Street, Cambridge, Mass., U.S.A.
Eugene W. Presbrey, 17, Trinity Place, New Rochelle, N.Y., U.S.A.
W. J. Davey, 19, Allfarthing Lane, Wandsworth Common, S.W.
Norman Egbert Pellon, 60, Sampson Road, Sparkbrook, Birmingham.

Paper Read.

"Monstrosities of *Tapes pullastra* and *Macra stultorum* from Studland Bay, Dorset," by J. E. Cooper.

Exhibits.

By Mr. G. C. Spence: A series of varied forms of the genus *Choanopoma*, from Jamaica and Cuba; and shells and eggs of *Urocoptis lavalleana* (D'Orb.), from Western Cuba.

By Mr. C. H. Moore: *Hyalinia cellaria* from Stalybridge.

By Mr. R. Welch: Curious forms of *Limnea pereger* from Whitesides Pit, Bispham (the late R. Drummond's collection).

By Mr. J. Wilfrid Jackson: *Paludestrina jenkinsi* from drains near railway station, Portstewart, Co. Derry; *Helix nemoralis* and dead sinistral example (first record for Co. Derry), from the sand-dunes, Portstewart; also large quantity of material from "shell-pockets" at same place, the species including *Vertigo pusilla*, *V. angustior*, *V. pygmaea*, *V. substriata*, *Punctum pygmaeum*, *Acanthinula aculeata*, *Carychium minimum*, *Euconulus fulvus*, *Vitrea crystallina*, *Jamnia muscorum*, *J. cylindracea*, *Clausilia bidentata*, *Cochlicopa lubrica*, etc., etc.

By the Rev. Lewis J. Shackelford: *Marginella diadochus* Ad. and Reeve, dredged off Saldanha Bay, S. Africa; and *M. musica* Hinds, dredged off Cape St. Blaize, S. Africa; *M. gruveli* Bavay from Bay of Praya Anulia, W. Africa; and *M. goodalli* Sow. from Senegal.

Note on the *Caryatis belcheri* of Römer.—Specimens of a *Pitaria* from S. Thomé Island, akin to *P. tumens* (Gmel.), have recently been submitted by us to M. Dautzenberg and to Mr. Jukes-Browne. The former reported that it was quite unknown to him; Mr. Jukes-Browne wrote also that he was unacquainted with the species, but pointed out that it was evidently the shell figured and described by Römer¹ as *Caryatis belcheri* Sow. An inspection of Sowerby's type in the British Museum shows that it is a totally different shell from Römer's, and tolerably well figured in the *Thesaurus*.² We therefore propose the name *Pitaria rømeri* for Römer's species, which he records from "insula 'do Principe' dicta, ad sinum Guineensem." The true *belcheri* Sow. has recently been dredged in several places off the Senegal coast by M. Gruvel.—J. R. LE B. TOMLIN and L. J. SHACKLEFORD.—(Read before the Society, June 11th, 1913).

¹ Mon. Gatt. Venus, p. 123, pl. 32, figs. 5-5C.
Thes. Conch., 11., p. 635, pl. 136, fig. 188.

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The Journal, which is supported by many prominent Naturalists of the District, deals with all branches of Natural History, and is rapidly increasing in circulation. Amongst the Conchological Notes and Papers which have already appeared are: "Notes on the Freshwater Mussels of Lancashire and Adjacent Counties"; "On the Mollusca from the 'Cave-Earth,' Dog-Holes, Warton Crag"; and others, which contain much valuable information of local and general interest,

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THE

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VOL. 14.

OCTOBER, 1913.

No. 4.

OBITUARY NOTICES.

(Read before the Society, Sept. 10th, 1913).

HUGH LAMONT ORR.

By R. WELCH.

HUGH Lamont Orr, a keen conchologist and an old member of the Belfast Naturalists' Field Club, on the committee of which he had served for many years, passed away on April 14th, 1913, at Belfast.

A fine amateur workman both in wood and metal, Mr. Orr was a very helpful friend to many a naturalist, young and old, and the Public Museum at Belfast contains many finely made cases of wasps' nests and other natural history specimens donated by him. He had been engaged on a local list of the wild bees and wasps of the north-east of Ireland for years past, and was a well-known figure on the hillsides, and in the glens and old woods of Louth, Antrim, and North Down. Mr. Orr became a member of the Conchological Society many years ago, and was a regular exhibitor in this branch at meetings of the Belfast Club named above, especially at their annual conversazione.

D. D. BALDWIN.

[We are indebted to *The Nautilus* for the following details as to Messrs. Baldwin and Taylor.—ED.].

DAVID Dwight Baldwin was born at Honolulu, on November 26th, 1831. He entered Yale College in 1853, graduated there with honours in 1857, and in the same year married a Miss Morris, whose acquaintance he had made during his college course. On returning to Hawaii he became principal of Lahaina School; but after seven years of school work he became interested in the cultivation of sugar cane, and was for seven years manager of a large plantation. Subsequently he resumed his old profession, and in 1877 was appointed Inspector-General of Schools, and it may be mentioned that under his régime the number of schools in which English was the basis of

instruction increased from five to one hundred. Though he resigned this appointment in 1885, it was not till twenty years later that he finally severed his connexion with the Department of Public Instruction. He was chiefly interested in shells, ferns, and mosses, and in 1893 published a "Catalogue of the Land and Freshwater Shells of the Hawaiian Islands," which, though brief and unpretentious, has been most useful for its reliable synonymy and its locality records. He described many new species of *Achatinellidae*, and has had at least nine Hawaiian novelties named after him, as well as *Baldwinia* Ancey—a section of *Partulina*. He died at Honolulu on June 16th, 1912.

REV. G. W. TAYLOR, D.D.

Dr. Taylor died at his home on Departure Bay, Vancouver Island, in August, 1912. He was well known as a student of the marine shells of the Pacific coast, and was also interested in Entomology and other branches of natural history. When the Dominion government established a marine biological station on the coast of British Columbia, Dr. Taylor chose the site for it, near Nanaimo, superintended the building, and remained in charge of the station when completed until his death.

He published a "Preliminary Catalogue of the Marine Mollusca of the Pacific Coast of Canada," with notes, in the Trans. Roy. Soc. of Canada, 1895-6; a supplement appeared somewhat later, and latterly he was engaged upon a new Catalogue which was never completed. He also published lists of the land and freshwater shells of Vancouver and of British Columbia. He leaves a very large and valuable collection of shells, particularly rich in *Unionidae* and *Patellidae*.

EDITORIAL NOTES.

A LARGE and influential Committee has been formed under the patronage of the Duke of Devonshire, with Mr. J. W. Taylor in the chair, to acquire the conchological collections and library of the late William Nelson, for the University of Leeds, as a permanent memorial of this excellent naturalist. About £100 is required, and subscriptions should be sent to the Hon. Treasurer and Secretary of the Committee, Mr. W. D. Roebuck. Nelson was one of the founders and first editors of the *Journal of Conchology*.

We have received the following interesting note from M. Bavay of Paris, with reference to *Marginella warrenii* Marrat, which was figured for the first time in our April number: "en examinant attentivement la belle figure que vous donnez de *M. warrenii*, j' ai été frappé du facies austral de cette coquille. Ne serait-ce pas

une *Marginella* des Iles Falkland ou du Cap Horn? N'y aurait-il pas une simple erreur de *lettre* dans l'indication de latitude et longitude donnée comme provenance? La latitude ne serait-elle pas 50° 25' 5" Sud au lieu de 50° 25' 5" Nord? Le premier point tombe entre les Iles Falkland et le Cap Horn. Je pense que *Marginella hahni* de Rochebrune et Mabilie, "Mission Scientifique du Cap Horn," 1882-3, t. vi. (Zoologie), Mollusques, p. 51, pl. iii., fig. 4, est la même espèce que celle de Marrat, qui, plus ancienne (1879), a la priorité."

It may not be superfluous to put on record the most important conchological sale of recent years—that of the Carl Bülow collection, which was dispersed at Stevens' Rooms, on February 27th. The collection, as most are aware, had been in Messrs. Sowerby & Fulton's hands for a considerable time on commission, and many of the rarities had thus been privately disposed of. The entire collection contained approximately 20,000 species, and included that of Herr Strubell—rich in land and freshwater shells.

We have lately had an opportunity of reading a collection of verse, entitled: "Verse—or Worse," from the pen of one of our members, Mr. F. H. Sikes, and should like to say at once that we failed to discover justification for the second part of the title! All the pieces (we gather from the preface) have already appeared in print in the *Globe*, *Westminster Gazette*, *Temple Bar*, *Chums*, *Boys' Own Paper*, or other papers. We can heartily recommend this small volume to anyone who enjoys short, witty verse, ingenious rhymings, clever bathos and a whimsical choice of subjects. We may perhaps be allowed to quote a verse from a parody on "The Assyrian Came Down" (p. 99), as being well within the scope of our *Journal*:—

"Like the head of a snail on a fine summer morn,
That pestilent 'scorchers' exalted his horn;
Like the head of a snail when encountering salt,
That 'scorchers' by evening found time for a halt."

The book is enriched with three pretty Icelandic sketches by the author, excellently reproduced by Messrs. Taylor Bros., of Leeds, who are the publishers.

Two very handy little volumes on the "Mollusques de la France et des Régions Voisines" have just been published in the "Encyclopédie Scientifique" series by O. Doin et Fils, 8, Place de l'Odéon, Paris. Vol. I. dealing with the *Amphineura* and *Opisthobranchiata* is by A. Vayssière, the well-known professor at the Marseilles Faculty of Science, who has made a special study of the Opisthobranchs for years. So much has recently been written on this order, that the volume will be a most useful up-to-date compendium and guide for students from every point of view. Vol. II. is from the pen of Louis Germain, of the Paris Natural History Museum, and treats of the land and freshwater gastropods of France. It will be of the utmost use to paleoartistic students, and we welcome it as an avowed attempt to bring about a wholesale reduction in the species created by the splitting propensities of Bourguignat, Locard, and others, though by no means the last word on that subject. M. Germain's remarks on the Bourguignat school are well worth reading, and he shows how their often misguided zeal has at any rate led to the increased study of polymorphism and of the effects of environment in producing variation. There are altogether 67 plates in the two volumes, but the figures are as a rule poor and very coarsely produced, and hardly up to the high standard of the letterpress. The price for the two volumes is ten francs.

AN APPARENT SELECTION OF FORMS OF *H. NEMORALIS* BY ADVERSE CONDITIONS.

BY A. E. BOYCOTT.

(Read Before the Society, March 12th, 1913).

IN 1907 I collected 310 specimens of a dwarfed (average 18.4×14.2 mm.) form of *nemoralis* from a sand-blown area of grass by the shore near Land's End. As I was informed, the sand had been blown on to, and more or less covered, the grass only within the preceding two or three years. At the same time I took 79 specimens of larger size (average 22.2×18.1 mm.) from among grass just beyond the reach of the sand and within a couple of hundred yards of the area where the smaller specimens occurred. Apart from the presence of sand, the two areas appeared to be of exactly the same character. The proportions of the two colour forms which were present and of the different bandings varied a great deal in the two series.

				Grass		Sand
Total number collected	...	...	...	79	...	310
<i>libellula</i> per cent.	...	...	...	43%	...	72%
00000	...	...	...	21	...	0.5
00300	...	...	...	26	...	6
12345	...	...	...	38	...	77
<i>rubella</i> per cent.	...	...	...	57%	...	28%
00000	...	...	...	67	...	none
00300	...	...	...	11	...	8
12345	...	...	...	18	...	78

In the sand specimens, therefore, *libellula* were proportionately more abundant (and the difference is beyond that which might be attributed to errors of sampling) and the band formulæ 00000 and 00300 were much less numerous. Altogether in the grass series 37 out of the 79 (or 47%) were 00000 and only one of the 310 sand specimens. I am inclined to attribute the difference to the elimination of the few-banded forms by the adverse influence of the sand. It seems clear from the small size of the shells that the general conditions were not favourable so that there is less to be said in favour of the alternative hypothesis that the sand encouraged the many-banded forms. Among the sand specimens were 25 of the formula 00045 which did not occur in the grass series.

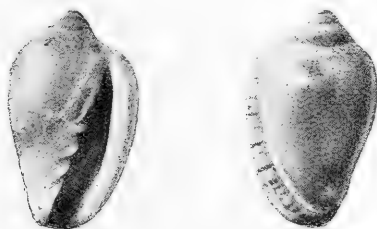
DESCRIPTIONS OF TWO NEW SPECIES OF MARGINELLA FROM SOUTH AFRICA.

BY J. R. LE B. TOMLIN, M.A.

(Read before the Society, September 10th, 1913).

Marginella pachista n.sp.—

Shell ovate-oblong, solid, smooth, polished, pinkish-brown in colour, generally with a broad rather indistinct whitish zone on the last whorl below the suture; last whorl shouldered; spire blunt; whorls $4\frac{1}{2}$ in number; suture fairly well marked; aperture rather broad, tinged with pink inside; columella nearly straight, with four strong plaits; lip very strongly thickened, sinuate above, so as to form a distinct sinus at the top of the aperture and a sort of denticiform excrescence on the labrum, considerably curved, simple within, white in colour with numerous pink spiral lines, which never seem to reach the inner side of the labrum and vary in number and intensity.



Marginella pachista.

Size :—Alt. 14·5 mm. ; diam. max., 8 mm.

Hab. :—East London & Umkomaas (Burnup); Tongaat (Alexander).

This species greatly resembles *M. vexillum* Redf. from West Africa, but the latter has the lip denticulate within and a much narrower aperture and canal. They have the same thickened, lineolate lip, but *M. pachista* is rather longer and narrower in form. It sometimes has a row of minute, distant brown dots on the last two whorls, and a second row on the last whorl, starting from the uppermost columellar plait. The type has a very small subsidiary plait on the columella, between the first and second plaits, but this appears to be accidental.

Marginella aphanospira n.sp.—

A small white, semitransparent species of the *Persicula* section; shell ovuliform, without spire; columella strongly convex above and concave below with two plaits; labrum slightly thickened, rising distinctly above the plane of the apex of the shell; aperture strongly

arcuate above, owing to the elevation of the labrum, in width about one-third of the maximum diameter of the shell; sculpture none.



Marginella aphanospira.

Size:—Alt. 3 mm.; diam. max. 2 mm.

Habitat:—Port Shepstone, one specimen (Burnup).

There is also a specimen in the Capetown Museum. Mr. Burnup has presented the types of the above two new species to the British Museum (Nat. Hist.).

Vertigo antivertigo in Staffordshire.—This mollusc has at last been turned up in Staffordshire. On the 4th August last, Mr. Bryan and I were examining pieces of decayed wood and bricks, in marshy ground, at Whiston, near Cheadle, when three *Vertigos* were found, which have since been identified by Mr. J. W. Taylor, together with another specimen found since in the same locality, as *V. antivertigo*. This is the first record of the species for this county. In the same marsh are to be found *Zonitoides nitidus*, *Limnæa truncatula*, *Carychium minimum*, and *Succinea putris*.—JOHN R. B. MASEFIELD, (Read before the Society, Nov. 13th, 1912).

Helicella itala L. m. sinistrorsum.—As it is of interest to note the frequency of the occurrence of sinistral specimens, I wish to record the finding of a fine sinistral *Helicella itala*, in September last, at Water Newton, in North Huntingdonshire. The shell is full grown, and assignable to var. *lutescens* Moquin-Tandon. This is the prevailing form in the district, the banded shell being exceedingly scarce.—C. E. Y. KENDALL (Read before the Society, Nov. 13th, 1912).

Pathological Malformation of Keel-line in Limax cinereo-niger.—Mr. Charles Oldham on the 30th September sent me a curious malformation of *Limax cinereo-niger* var. *luctuosa*, which he took that day in a wood near Martin Chapel, Berkhamsted, Herts., in which the pale keel-line is discontinuous in a curious manner, comparable in appearance to a geological fault. Half-way down the back the line ends abruptly but begins again on the right of it equally abruptly but with about three rugosities of the ground-colour between. This variation can be easily represented in printer's rules, thus:—



The keel-line is very distinct and plain throughout. I have kept the example alive and well ever since to 30th Nov., but then put it in formalin for deposit in the Conchological Society's collection.—W. DENISON ROEBUCK (Read before the Society, Dec. 11th, 1912).

THE NON-MARINE MOLLUSCA OF WORCESTERSHIRE.

By NORMAN G. HADDEN.

(Read before the Society, Dec. 11th, 1912).

So far as I have been able to find, very little has been published regarding the molluscan fauna of Worcestershire, and I have consequently been induced to collect any available records, and place them along with my own observations which extend over the last seven or eight years. Although the geology, botany (both phanerogamic and cryptogamic), entomology and ornithology of the county have received a great amount of attention, the mollusca have been very much neglected. In the Census published in the *Journal of Conchology* of January, 1911, Worcestershire is credited with ninety-five species, to which at least ten more should be added if our old records could be verified.

The late Mr. C. Reece, of Worcester, did a considerable amount of conchological work in the county, principally in the southern portion, and his collection of local shells is now in the Worcester Museum. Mr. T. E. Doeg, of Evesham, has recorded in the Guide to Evesham (Homeland Series, 1908) between fifty and sixty species from the neighbourhood of Evesham and Bredon Hill. My own collecting has been principally done in the parish of Earls Croome, which lies nine miles south of the city of Worcester and one mile east of the Severn, and also in the Malvern district.

In the "Transactions of the Malvern Field Club," for 1853-70, there is a list of Malvern shells, compiled by Dr. Griffiths, but unfortunately several of these records are highly doubtful. Such species as *Helicella barbara*, *Clausilia biplicata*, *Pupa anglica*, and *Unio margaritifera*, are almost certainly erroneously recorded. By far the most complete list published is that in the "Victoria County History," vol. i., compiled by Mr. B. B. Woodward, and published in 1901. This list is evidently based on Dr. Griffiths' list, many of the localities being quoted from his catalogue, including *Pupa secale*, which Mr. Woodward states is a doubtful record. It seems quite possible that this species has been found near West Malvern, in the limestone district, but though this locality may be said to be in the "Malvern district," it is not in Worcestershire, but in Herefordshire.

It may be well to give a rough description of the geology of the county. The Keuper Marls stretch from the Malvern Hills for some four miles east of the Severn, whence the Lower Lias becomes the principal formation across the southern half of the county. In the north-western part we have the Bunter sandstone in the neighbour-

hood of Stourbridge and Kidderminster; then a narrow strip of Lower Keuper sandstone stretching from Witley to Hagley and bending eastwards as far as Bromsgrove, where it joins the Keuper marl, stretching roughly from the south-western to the north-eastern corner of the county. The Wenlock limestone is represented in the county around Tenbury and Clifton-on-Teme, while the Coal Measures appear in the Wyre Forest district. The Lower Oolite occurs on Bredon Hill.

There are several detached portions belonging to Worcestershire, but situated as "islands" in Gloucestershire or Staffordshire, but for conchological purposes these detached portions are included with the county which surrounds them; for this reason we cannot claim *Ena montana* amongst the Worcestershire mollusca, as it is only recorded from one of these "islands," Dovedale, Blockley.

The county is watered by the Severn, the Warwickshire Avon, and the Teme, besides lesser streams. The Severn enters the county at Arley in the north, and passing through Worcester is joined on the Gloucestershire borders by the Avon at Tewkesbury. The Teme joins the Severn at Powick near Worcester. Worcestershire has no natural lakes, but there are several large artificial reservoirs and ornamental pools, as at Cofton Hackett, Pirton Pool, and Westwood Park near Droitwich.

It will be apparent from the list now given that only a very small portion of the county has been worked at all thoroughly from a conchological standpoint, and doubtless several further species (particularly in *Pisidium*) might be added to the list by workers in hitherto unexplored localities, while the distribution of many apparently rare species would be found much wider than we are at present led to believe. The southern portion of the county has been the most worked, especially the Malvern district, but as mentioned above one cannot place too much reliance on old records of limestone-loving species from "Malvern"; these generally refer to a limestone ridge at West Malvern, which was formerly a part of Worcestershire, but has in recent years been ceded to Herefordshire. As it is the most productive locality for shells near any of the Malverns it has naturally received considerable attention from all local collectors; *Pyramidula rotundata* var. *alba* Moq.-Tand. is not uncommon there as well as several species that are rare within the county boundary.

Careful examination of river rejectamenta may yield some more species to the list, but I must confess to having obtained very little result from examination of a quantity of débris from the Severn after floods. The Avon and Teme would probably give better results.

In Dr. Griffiths' list *Hygromia granulata* ("*Helix sericea*") is said

to have been collected by Mr. Reece, and to be in the Worcester Museum, but there are no examples of this species shown in the local collection there at the present time. Possibly they were wrongly determined and removed. *Vivipara contecta* Millet is recorded in the "Victoria County History" list, but this probably referred to a tablet of shells in the Worcester Museum so labelled, which prove to be merely *V. vivipara*.

Testacella maugei Fér.—Occasionally found in nursery gardens in Worcester.

T. haliotidea Drap.—Very local, but not uncommon in gardens in Worcester.

T. scutulum Sowerby.—Recorded in the "Victoria County History," but no locality stated. This species is not represented in the Worcester Museum local collection.

Limax maximus Linné.—Generally distributed, but not abundant. Malvern. Earls Croome. Worcester. Shrawley Wood.

L. flavus Linné.—Recorded in the "Victoria County History" list, but not localised.

L. arborum Bouchard-Chantreaux.—Frequent throughout the county on old tree stumps and logs. Earls Croome. Malvern. Worcester (Reece). Fries Wood. Witley Park. Shrawley Wood. Brace's Leigh.

Agriolimax agrestis Linné.—Abundant everywhere, in fields, gardens, and woods.

A. lævis Müller.—Local; only obtained amongst decaying *Carices* in very damp places. Newpool, Malvern. Severn Stoke. Defford Common. Craycombe Hill near Evesham.

Milax sowerbyi Fér.—In gardens, local. Malvern. Earls Croome. Stourport ("Victoria County History").

M. gagates Drap.—Recorded in "Victoria County History," but no locality given.

Vitrina pellucida Müller.—Generally distributed. Frequently obtainable on old sheep droppings on North Hill, Malvern; dead earthworms are also attractive to this species. Malvern. Worcester (Reece). Earls Croome. Evesham. Witley. Shrawley Wood. Sarn Hill. Madresfield.

Vitrea crystallina Müller.—Frequent on rotten logs. Malvern. Near Worcester (Reece). Earls Croome. Witley. Madresfield.

V. cellaria Müller.—Plentiful throughout the county. Malvern. Worcester (Reece). Earls Croome. Evesham (Doeg). Witley. Madresfield. Sarn Hill. Ockeridge.

var. **complanata** Jeffreys.—Earls Croome.

var. **albina** Moq.-Tand.—Witley Park.

V. rogersi B. B. Woodward.—“Lincomb” (“Victoria County History”).

V. alliaris Miller.—Common and widely distributed. Malvern. Worcester (Reece). Earls Croome. Witley. Sarn Hill. The Rhydd. Bredon Hill (Doeg).

V. nitidula Drap.—Plentiful in woods and copses, occasional in gardens. Malvern. Near Worcester (Reece). Earls Croome. Witley. Sarn Hill. Evesham (Doeg).

var. **nitens** Michaud.—Earls Croome.

var. **helmii** Alder.—Earls Croome. Very scarce.

V. pura Alder.—Rather local in woods, rarely in gardens. Malvern. Earls Croome. Acock's Green (“Victoria County History.”)

V. radiatula Alder.—Local. This species prefers damper situations than *V. pura*. Earls Croome. Lincomb (“Victoria County History”).

Zonitoides nitidus Müller.—Rare. North Hill, Malvern (amongst stones in a valley). Near Worcester (Reece).

Euconulus fulvus Müller.—Widely distributed and generally common. Malvern. Earls Croome. Sarn Hill. Witley. Near Worcester (Reece). Madresfield.

Arion ater Linné.—Common throughout the county.

A. subfuscus Drap.—Local. Witley Park. Stourport (“Victoria County History”).

A. hortensis Fér.—Abundant in gardens throughout the county. It is our most destructive species in flower borders and rock gardens.

A. fasciatus Nilsson.—

var. **circumscriptus** Johnston.—Malvern. Earls Croome. Lincomb (“Victoria County History”).

Punctum pygmæum Drap.—Widely distributed and probably often overlooked. Earls Croome (plentiful). Henwick (Reece). Witley. Old Hills, Madresfield.

Sphyradium edentulum Drap.—Local, but has probably escaped notice owing to its minuteness. Newpool copse, Malvern. Earls Croome. Near Worcester (Reece). Acock's Green (“Victoria County History”). Marsh Wood, Baughton.

Pyramidula rupestris Drap.—Bredon Hill (under top stones of walls, Doeg). “Malvern District” (“Victoria County History”).

P. rotundata Müller.—Common throughout the county. Malvern. Worcester. Evesham (Doeg). Earls Croome. Witley. Shrawley. Sarn Hill.

var. **pyramidalis** Jeffreys.—Earls Croome. Three examples only.

Helicella virgata DaCosta.—Very local. “On Bredon Hill and other upland pastures” (Doeg).

H. itala Linné.—Confined to calcareous soils. Local. Baughton. Near Worcester (Reece). Bredon Hill (Doeg). Near Evesham.

H. caperata Montagu.—Rather local, but plentiful where it occurs on calcareous soils. Hill Croome. Malvern (rare). Bredon Hill. Near Worcester (Reece). Wind’s Point near Malvern. Haselor near Evesham.

H. cantiana Montagu.—Very local. “Boat Lane and Worcester Road, Evesham” (Doeg). Earls Croome.

Hygromia granulata Alder.—Recorded in “Victoria County History,” no locality stated.

H. hispida Linné.—Common in woods, waste places, and gardens. Malvern. Earls Croome. Near Worcester (Reece). Sarn Hill. Witley.

var. ***hispidosa*** Mousson.—Malvern. Earls Croome.

var. ***albida*** Jeffreys.—Earls Croome. Worcester (Reece).

H. fusca Montagu.—Mentioned in Dr. Griffiths’ list of Malvern shells, but no further records are available.

H. rufescens Pennant.—Widely distributed, sometimes plentiful in gardens. Malvern. Earls Croome. Worcester (Reece). Evesham (Doeg).

Acanthinula aculeata Müller.—Apparently local, but easily escapes notice. Earls Croome. Malvern. Old Hills, Madresfield.

Vallonia pulchella Müller.—Widely distributed, not infrequent amongst roots of grass. Earls Croome. Madresfield. Evesham (Doeg).

V. costata Müller.—To be obtained in similar situations to the last species. Earls Croome. Near Worcester (Reece). Evesham (Doeg).

V. excentrica Sterki.—Probably as widely distributed as the two preceding species. I have taken all three together on a heap of leaf soil at Earls Croome. Malvern (one dead shell in garden).

Helicigona lapicida Linné.—Very local. Kent’s Green near Worcester (W. H. Edwards). Atch Lench and Blockley (Doeg). I have found an old worn shell at Leigh Sinton near Malvern.

H. arbustorum Linné.—Very local. Near Worcester (Reece). “Plentiful in damp woods, Evesham” (Doeg).

Helix aspersa Müller.—Abundant everywhere in the neighbourhood of gardens and waste patches once under cultivation. No varieties have been recorded from the county.

H. nemoralis Linné.—Occurs throughout the county, but not in

the large colonies to be found in some districts. The most frequent forms are 00000 and 00300.

H. hortensis Müller.—More local than *H. nemoralis* and never abundant. Malvern. Worcester (Reece). Evesham (Doeg). Earls Croome.

var. **lutea** Moquin-Tandon—Malvern.

[**Ena montana** Drap.—Very rare. Only recorded from Dove-dale, Blockley, by Mr. Doeg, where it occurs on beech trees. Blockley is a detached portion of Worcestershire surrounded by Gloucestershire].

Ena obscura Müller. — Somewhat local. Malvern. Earls Croome. Near Worcester (Reece). Evesham (Doeg).

Cochlicopa lubrica Müller.—Widely distributed and generally common. Malvern. Earls Croome. Near Worcester (Reece). Evesham (Doeg). Defford Common. Sarn Hill. Witley. Shrawley Wood.

Azeca tridens Pulteney.—Very local. Generally confined to calcareous soil. Baughton Hill. Near Worcester (Reece). Hampton churchyard (Doeg). Sarn Hill. "Acock's Green and Malvern district" ("Victoria County History").

Cæcilioides acicula Müller.—Owing to the subterranean habits of this minute species it is rarely obtained alive. I have obtained half-a-dozen living examples at the bottom of flower pots sunk into the ground in a strawberry bed at Earls Croome. Malvern (two dead shells in garden). Near Worcester (Reece).

Jaminia secale Drap.—Very rare and local. "Broadway and Dovedale, Blockley" (Doeg). "Malvern district" ("Victoria County History"). This last is probably an erroneous record.

J. cylindræa DaCosta.—Widely distributed, frequently in large colonies. Malvern. Earls Croome. Worcester. Evesham (Doeg).

J. muscorum Linné.—Local and rather rare. Defford Common (Reece). Earls Croome. Boat Lane, Evesham (Doeg).

Vertigo antivertigo Drap.—"Malvern district" (Victoria County History). It is not represented in the Worcester Museum local collection, and I can find no other records of this species.

V. pygmæa Drap.—Apparently very local, but careful search should reveal it in many other localities. Newpool copse, Malvern. Earls Croome. Selly Oak ("Victoria County History").

V. pusilla Müller.—Very rare. In spite of constant search I have only obtained five adults and one immature example, all within a radius of a few yards. Earls Croome, in a rather dry copse consisting mainly of elms.

Balea perversa Linné.—“Malvern district” (“Victoria County History”). No other records.

Clausilia laminata Montagu.—Very local, but probably occurs in most woods on calcareous soil. Baughton. Near Worcester (Reece). Sarn Hill.

C. bidentata Ström.—Widely distributed and abundant in some stations. Malvern. Earls Croome. Near Worcester (Reece). Baughton. Witley. Sarn Hill.

Succinea putris Linné.—Widely distributed but not common. Newpool, Malvern. Earls Croome. Near Worcester (Reece). Near Evesham (Doeg).

S. elegans Risso.—Rather more frequent than the preceding species. Earls Croome. Hartlebury. Near Worcester (Reece). Stourport and Acock's Green (“Victoria County History”).

Carychium minimum Müller.—Common and widely distributed. Malvern. Earls Croome. Near Worcester (Reece). Near Evesham. Witley. Sarn Hill. Madresfield.

Ancylus fluviatilis Müller.—Local. The specimens recorded from Malvern Hills are probably from the Herefordshire side of the range where the species is plentiful. “Malvern Hill” and R. Severn (Reece). R. Avon (Doeg). Dowles brook, Wyre Forest.

Acroloxus lacustris Linné.—Very local but abundant where it occurs. Madresfield. Near Worcester (Reece). R. Avon (Doeg).

Limnæa auricularia Linné.—Widely distributed and plentiful in the Avon. Avon near Bredon. Avon and Severn (Reece). Avon near Clerk's Hill, and at Wood Norton (Doeg). Madresfield.

L. pereger Müller.—Common throughout the county. No distinct varieties recorded. Malvern. Worcester. Pirton and Feckenham (Reece). Earls Croome. Defford. Hartlebury. Madresfield. Hollybush Pass on Malvern Hill. Castlemorton Common. Longdon.

L. palustris Müller.—Very local. Hartlebury Common. Kempsey Grove (Reece). R. Avon near Twynning.

L. truncatula Müller.—Widely distributed but not very plentiful. Malvern Link. Earls Croome. Hill Croome. Longdon Marsh. Near Worcester (Reece). R. Avon near Twynning.

m. **decollatum**.—Midsummer Hill, Malvern (Reece).

L. stagnalis Linné.—Local, but fairly plentiful where it occurs. Defford Common. Welland Common (Reece). Woodnorton (Doeg).

L. glabra Müller.—Very rare. Hartlebury Common (“Victoria County History”).

Planorbis corneus Linné.—Very local. Yardley (Thomasson). Ditches and ponds connected with the Avon (Doeg).

P. albus Müller.—Frequent in ponds. Malvern. Earls Croome. Near Worcester (Reece). Dowles, Wyre Forest.

var. **draparnaldi** Sheppard. — Pirton Pool (Reece). Earls Croome.

P. glaber Jeffreys.—Very rare. Newpool, Malvern, amongst the alga *Cladophora*.

P. crista Linné.—The type is not infrequent in small and large ponds. Malvern. Earls Croome. Northwick Pool (Reece). A white form at Madresfield in company with the type.

var. **lævigata** Adams.—Much more plentiful than the type in some stations.

P. carinatus Müller.—Apparently rare and local. Earls Croome. Upper Wick (Reece).

P. umbilicatus Müller. — Widely distributed and sometimes abundant. Castlemorton Common. Earls Croome. Hartlebury. Worcester (Reece). Dowles Brook, Wyre Forest.

P. vortex Linné.—Widely distributed but rarely abundant. Earls Croome. Defford Common. Near Worcester (Reece). Haselor near Evesham (Doeg).

P. spirorbis Linné.—Generally distributed and often abundant. Malvern. Earls Croome. Near Worcester (Reece). Evesham (Doeg). Hartlebury. Defford Common. Castlemorton Common. Throckmorton.

P. contortus Linné.—Local, but fairly plentiful where it occurs. Near Malvern. Earls Croome. Near Worcester (Reece). Evesham (Doeg).

P. fontanus Lightfoot.—Rather local. Malvern. Earls Croome. Near Worcester (Reece).

Segmentina nitida Müller.—Rare and very local. "Stinton Pool, Crossway Green, and Malvern" ("Victoria County History").

Physa fontinalis Linné. — Widely distributed and generally plentiful. Earls Croome. Castlemorton Common. Birtsmorton. Near Worcester (Reece). Brooks running into the Avon (Doeg).

var. **curta** Jeffreys.—Hill Croome.

Aplecta hypnorum Linné.—Much more local than the last species. It appears partial to small pools that dry up in the summer. Marsh Common, Defford. Earls Croome. Near Worcester (Reece).

Paludestrina jenkinsi Smith.—This is plentiful in a backwater of the Severn at the Mythe Toot, Tewkesbury, just on the borders of

the county boundary line. I have not seen it elsewhere, but it probably occurs in similar localities further up the river.

Bithynia tentaculata Linné.—Widely distributed in weedy ditches throughout the county. Castlemorton Common. Earls Croome. Near Feckenham (Reece). Avon (Doeg).

var. **ventricosa** Menke.—Near Feckenham (Reece). Earls Croome.

B. leachi Sheppard.—“Malvern” (“Victoria County History”). R. Teme (Reece). R. Avon near Twynig.

Vivipara vivipara Linné.—Local, but abundant where it occurs. Avon near Bredon. Worcester and Birmingham Canal and Severn (Reece). Avon at Glover’s Isle and Fladbury (Doeg).

Valvata piscinalis Müller.—Apparently rare and local. Hartlebury Common. River Severn (Reece). Malvern (“Victoria County History”).

V. cristata Müller.—Local, but fairly plentiful where it occurs. Earls Croome. Kempsey Grove (Reece). Near Worcester (“Victoria County History”).

Pomatias elegans Müller.—“Malvern and Bewdley” (“Victoria County History”). Dovedale, Blockley (Doeg). The Malvern record probably refers to West Malvern specimens. This is not within the Worcestershire boundary, but in Herefordshire.

Neritina fluviatilis Linné.—Very local. R. Severn (Reece). Avon below Harvington Mill, the weir at Evesham, and other parts (Doeg). Malvern and R. Severn (“Victoria County History”). R. Teme.

Dreissensia polymorpha Pallas.—Abundant where it occurs. R. Severn and Worcester and Birmingham Canal (Reece). The Avon, abundant below Chadbury Hill (Doeg).

Unio pictorum Linné.—Very local but abundant in parts of the Avon. Avon near Bredon. Avon and Teme (Reece). Plentiful in the Avon (Doeg). R. Teme at Powick.

U. tumidus Retzius.—Distribution similar to that of the preceding species. Avon near Bredon. Common in the Avon (Doeg). Great Witley (Reece). R. Teme at Powick.

Anodonta cygnæa Linné.—Widely distributed in the rivers and large ponds of the county. R. Severn. R. Avon. Birtsmorton Moat. Callow End. Avon in great abundance (Doeg). R. Teme.

var. **anatina** Linné.—Much more local than *A. cygnæa*, but occurs in parts of the Avon, Severn, and Teme.

var. **arenaria** Schröter.—Specimens of this variety are in the local collection in the Museum at Worcester (labelled var. *zellersis*) from Lawn Brook and Knighthill Pool, Severn Stoke.

Pseudanodonta rothomagensis Loc.—This interesting addition to the British list was obtained by Messrs. Foxall and Overton in August, 1905, in the River Teme at Powick, where it occurs in considerable abundance. See *Journal of Conchology*, vol. xiii., p. 274. Common in the Teme at Bransford Bridge (Tomlin).

Sphærium rivicola Leach.—Very local, but plentiful in a few localities. Avon near Bredon. Near Worcester in the canal (Reece). Avon (Doeg). Malvern ("Victoria County History").

S. corneum Linné.—Common in most ditches and streams throughout the county. Malvern. Earls Croome. Avon (Reece). Hartlebury Common. Castlemorton Common. Dowles Brook, Wyre Forest.

var. **scaldiana** Norman.—Near Feckenham (Reece).

S. lacustre Müller.—Widely distributed but not very common. Earls Croome. Avon near Bredon. Ponds near Evesham (Doeg). Near Worcester (Reece).

var. **brochoniana** Bourguignat.—Diglis near Worcester (Reece).

S. pallidum Gray.—Very rare. Castlemorton Common (Reece). Avon at Glover's Isle (Doeg). Also recorded in the "Victoria County History," but no locality given.

Pisidium amnicum Müller.—Very local. Castlemorton Common (Reece). Avon, gravelly parts (Doeg).

P. supinum Schmidt.—Very rare, only one record apparently hitherto. R. Severn near Bewdley (H. Overton in *Journal of Conchology*, vol. 13, p. 45).

P. henslowianum Sheppard.—Very local. Near Worcester (Reece). Hall Green and nr. Worcester ("Victoria County History").

P. subtruncatum Malm.—Very local. Near Malvern. Near Worcester and Moseley ("Victoria County History").

P. pusillum Gmelin.—Occurs abundantly in many ponds and ditches. Malvern. Earls Croome. Evesham (Doeg). Defford Common. Hill Croome.

P. obtusale Pfeiffer.—Very local, but should be searched for where *P. pusillum* is plentiful. Hill Croome. Dowles Brook. Near Worcester (Reece).

P. nitidum Jenyns.—Recorded in the "Victoria County History."

P. gassiesianum Dupuy.—Probably much more frequent than the paucity of records leads one to infer. Earls Croome. Dowles Brook, Wyre Forest.

NOTES ON THREE SPECIES OF CYPRÆA.

By J. KIDSON TAYLOR.

(Read before the Society, February 12th, 1913).

My intention in writing this paper is to endeavour to shew that the three following forms—*Cypræa petitiana* Crosse & Fischer, *C. nebulosa* Kiener and *C. cernica* Sowerby—are all entitled to specific rank, and are not to be, as now, merely regarded as varietal forms of other well-known species.

C. petitiana Crosse & Fischer.—

This shell has been generally misunderstood, partly from its rarity in collections, and more so from the absence of examples in a fully adult state, and so it has been frequently, if not always, thought to be a variety or growth form of *C. pyrum* Gmelin. This, I am absolutely convinced, cannot be the case, as I have recently acquired a fully adult specimen in the finest possible condition.

This shell differs materially from *C. pyrum* in its most salient characters; its only similarity—and that a superficial one—being the painting and colour of the dorsal region; in every other respect it has no resemblance whatever to *C. pyrum*.

In *C. petitiana* the shell is ovate, slightly pyriform, with the extremities subrostrate, while in *C. pyrum* it is oblong-ovate, decidedly pyriform and ventricose; the extremities very much produced, especially the anterior end, where the shell is distinctly attenuated and narrowed, giving it a pinched-in appearance. The colour of the back of the shell is practically similar in both species, a yellowish-chestnut, spotted with white and freckled and blotched with darker fuscous markings, with the addition in *C. pyrum* that the back is distinctly banded with a darker colour, alternated generally with narrow whitish zones. In *C. petitiana* the lateral margins and extremities are broadly flesh-coloured, with the base of a slightly deeper tint, teeth whitish; but in *C. pyrum* the base, lateral margins, and extremities are of a brilliant orange-brown, lighter when immature, but never of the pale flesh colour which prevails in *C. petitiana*; the teeth are whitish, interstices sometimes rosy. The aperture of *C. petitiana* is narrow and slightly sinuous; the teeth of the outer lip number 18, of the columellar lip 16. In *C. pyrum* the aperture is rather narrow, arcuated above, subdilated below, roundly margined at each end, the outer lip extended above, with from 16—22 teeth; columellar lip inside nearly smooth, teeth 14—16, thickish, rather wide apart at the anterior extremity, the others short, linear, not elongated inside.

Hidalgo, in his recently published and important work on the Genus *Cypræa*, has the following remarks on this species:—

"This species of *Cypræa* requires to be studied anew, because Crosse considers it distinct; Sowerby judges it a variety of *C. nebulosa*; and Roberts looks upon it as no more than a modification of *C. pyrum*. I have seen in Paris, in the collection of my friend Dautzenberg, examples classified as *C. petitiana* (half-grown) which appear to me only a variation of *C. pyrum*, and two others in the Jousseaume collection nearer to Sowerby's figures 354 and 355 in *Thesaurus Conchyliorum* and somewhat distinct from those of Dautzenberg. Not having these at my disposal at the time of writing, I cannot decide which of the three authors is most in the right. Of all methods, comparative examination of the characters of the aperture, size, position, and number of the teeth, will serve more than the colouration of the shell to establish or not the resemblance with *C. pyrum* and *nebulosa*, because I will call attention here to the fact that the var. *nymphæ* of *C. onyx* Linné, so different from the type in its colour, is identical in form and teeth of the aperture."

I quite recently sent my specimen to Mr. J. Cosmo Melvill for his opinion; he writes to me:—

"Your shell is indeed a fine *C. petitiana*; it exactly agrees with mine, a fine live specimen, but only half the size of yours; it has been considered a variety of *C. pyrum*, but I don't now think it is; it seems to possess distinctive qualifications."

I have seen another example in the collection of Mr. Loftus Byne, but this also is quite small, clearly showing two narrow white zones, precisely the same as in the figure of Sowerby, before mentioned; this I take to be not full grown.

The dimensions of my shell are:—

Length, 31 mm.; breadth, 19 mm.; altitude, 15½ mm.

Habitat, River Gambia, West Africa.

C. nebulosa Kiener.—

I cannot at all agree with Roberts in making this a variety of *C. zonata* Chemn., its shape, markings, and general appearance being so widely distinct. In shape it is much more ovate, less pyriform, the anterior extremity not nearly so attenuated and produced, with the terminal blotches much less evident; in *C. nebulosa* also the right lateral border is crassated and wider, obtusely angulated, the marginal spots ash-coloured and fainter. The dorsal surface is also ash-coloured, with clouded ferruginous markings, and no zonal bands; its base is rosy-white or straw-coloured. In contrast to this, *C. zonata* is more pyriform, rounded at the sides, extremities produced, thickish, laterally margined at the extremities, the anterior end subattenuate and truncate; ground colour of the back pale

greenish, freckled with olivaceous markings ; its most distinguishing feature is, however, its transverse trifasciation, the central band sometimes broken up into zigzag flames, sometimes duplicated, and occasionally only the central band being present ; the sides are yellowish-ash colour or tawny, with numerous, rather large blackish spots, the base is pale ochreous or dusky-ash colour, conspicuously spotted.

I submitted also to Mr. Melvill my specimens of *C. nebulosa*, suggesting to him that I thought they had much more affinity to *C. petitiانا* than to *C. zonata*, to which he replied :—

“There is some external resemblance, particularly to *C. petitiانا*, but I think no real alliance ; the lateral clouding and spotting of *C. nebulosa* shows it nearer to *C. punctulata* Gray, *C. zonata* Chemn., *C. picta* Gray, and that group. Your specimens quite agree with four I have, all exactly alike, and which are from the same locality, River Gambia, West Africa.”

C. cernica Sowerby.—

This shell has been confused by numerous authors, both in their figures and publications, as a variety of *C. spurca* Linné ; with these I entirely disagree, contending as I do, that *C. cernica* is an absolutely distinct species.

In shape, *C. cernica* is totally different, much shorter ; and in mature specimens rounder, with the lateral margins angulated and turned upwards in the middle towards the dorsum ; these margins are excavated and pitted, with obscure dots all round the rim, which dots do not coincide with these foveæ. The dorsum is ochreous-yellow, sprinkled all over with round white spots, well separated from each other. The sides and base are pure white, the latter convex. In length, *C. cernica* only attains 17—27 mm., while *C. spurca* is much larger, reaching at times 40 mm.

The habitat of these two species is very important. Apart from the consideration of structural differences, the broad line of demarcation in habitat is too well defined in *C. spurca* and *C. cernica* to admit of one being merely a geographical variant ; otherwise surely the two forms would sometimes be found in proximity, and of this I can find no instance recorded.

C. cernica occurs throughout the Indian and Pacific Oceans, from Mauritius to New Caledonia. *C. spurca* is found in the Mediterranean, Azores, and all down the west coast of Africa as far as the Cape of Good Hope ; and in the case of *C. acicularis* Gmel. (which has the base pure white), throughout the Antilles ; I have several specimens of this from Cayman Brac, West Indies.

Mr. Melvill, to whom I submitted this paper, says :—

"I agree with it all, as far as *C. petitiiana*, *C. nebulosa*, and I think *C. cernica* are concerned ; this last has always seemed to me different from *C. spurca*, not only in form, but in locality, and the clear dorsal spotting ; I considered this in the "Survey" (1888) a var. of *C. spurca* it is true, but have been gradually coming round to an opposite opinion, and to sum up, I do not at all demur from your view and proposal to grant it specific rank."

In conclusion, I beg to acknowledge the great assistance that the work of Dr. Hidalgo has afforded me in compiling this paper ; and I must thank Mr. Melvill for his timely aid and comments.

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN & IRELAND.

423rd Meeting, held at Manchester Museum, June 11th, 1913.

Mr. E. Collier in the chair.

The Secretary reported that the usual exchanges had been received.

Candidates proposed for Membership.

Mrs. E. Fordred, "Wychmont," St. Bernard's Road, Olton, Warwickshire (recommended by H. Overton and Albert Wood).

H. F. D. Bartlett, F.E.S., 1, Myrtle Road, Bournemouth (recommended by J. R. le B. Tomlin and L. J. Shackleford).

Member Deceased.

Hugh Lamont Orr (a letter of condolence has been sent to the late member's family).

Paper Read.

"Note on *Caryatis belcheri* of Römer," by J. R. le Brockton Tomlin, M.A., and Lewis J. Shackleford.

Exhibits.

By Mr. G. C. Spence : Specimens of *Archegocoptis eximia* Pfr., *A. crenulata* W. & M., and *Helicophanta farafanga* Angas.

By Mr. E. Collier : *Helix aspersa* from the gardens of the Villa D'Este, Tivoli, near Rome, and also the same species from Fiesole, near Florence, but quite different from the Tivoli specimens ; also *H. vermiculata* from Fiesole.

By Mr. J. R. le B. Tomlin and Rev. L. J. Shackleford : A set of *Pitaria römeri* n.sp., from São Thomé, G. of Guinea, to illustrate their note on *Caryatis belcheri* of Römer.

By Rev. L. J. Shackleford : A fine living specimen of *Helix pomatia* from Basingstoke, Hants.

HELIX ASPERSA m. SCALARIFORME Taylor.

By J. R. B. MASEFIELD.

(Read before the Society, March 10th, 1913).

IN THE 'Queen' newspaper for the 30th November last was a photograph of a living specimen of this variety of mollusc which had been deposited at the London Zoo from Haverfordwest, Pembrokeshire. The whorls are absolutely separated in the form of an elongated cornucopia and consequently there is no columella. With the description of this shell it was stated that the keeper found this mollusc "walking abroad without its shell, whereupon it was promptly seized and again safely housed, since when it has not broken bounds." I communicated with Mr. R. I. Pocock, the superintendent of the Zoo, as to this somewhat startling announcement, and he very kindly allowed me to examine this snail last month. I found it crawling up the glass side of its case, and I noticed on handling the shell that the two top whorls were transparent, and the body of the mollusc extended only a little beyond the large bottom whorl. Besides this, the apex of the shell appeared to have received injury sometime, and was slightly decollated. On placing the animal in tepid water for a short time it soon crawled out over my hand. When extended to its full length, and by using a very slight pull, the whole body came absolutely out of its shell and crawled about in an apparently happy condition. We afterwards replaced the mollusc in its shell. I take it that from some cause the retractor muscles had become atrophied or had never developed at all in consequence of there being no columella. Mr. J. W. Taylor tells me that he has known similar instances before, and in the *Journal of Conchology*, vol. iv., p. 101, he states that an account is given in the "Journal de Conchyliologie" of a specimen of this form, which was entirely detached from its shell and continued healthy and active. In vol. ix. of the *Journal of Conchology*, p. 112, Mr. A. G. Stubbs gives another instance in the case of *Limnæa peregra*, attributing the occurrence to disease, and at pp. 164 and 217 of the same volume other instances are given.

NOTES ON THE SECTION TACHEA OF HELIX.

BY EDWARD COLLIER.

(Read before the Society, March 12th, 1913).

THE Genus *Helix* contains the most highly organized species of the Family *Helicidae*, and the members of the Section *Tachea* seem to be amongst the most highly specialized forms of this genus, and evidently fitted for meeting widely diverse conditions of existence.

This section is held by some to have originated on the Central Asian Plateau, by Dr. Scharff and others in South-western Europe, but Mr. J. W. Taylor maintains "that its true evolutionary area is decidedly within the Germanic region, from whence it has spread and is gradually spreading in all directions, penetrating eastwardly through the South Russian provinces by precisely the same route as *Helix pomatia*, thus contributing to confirm this as the true eastward track of the dominant European species."

Tachea is one of the most dominant European groups, and is found nearly all over Europe, except in the eastern portion of Russia. One species has extended its range from Spain into Morocco, another species is found in Asia Minor, while one—and that the largest of the group—is found in the Caucasus, and on into Persia, along the southern shore of the Caspian Sea. Another species, and that one of the commonest, has extended its range into North America.

The *Tacheas* are of very ancient lineage, as *H. nemoralis* is recorded from the Lower Miocene deposits in the south of France, and has been found in this country in the Pleistocene and Holocene deposits from a large number of localities.

The shell is globose to subglobose, or depressed, generally thin, rather solid, smooth in most species, but in the larger species striate, or even malleate. They have an umbilicus open when young, but becoming closed in adult life. Whorls 5, the last deflexed in front, tumid. Aperture wide-lunar, oblique, lip expanded and thickened within, the columellar margin straight, widened by a blade-like callus within. They are nominally all five-banded, but they are very often found with fewer bands, and in many cases without bands at all. They are the most highly coloured of European land shells, as well as the most variable in colour. They live on shady banks, walls and bushes, in gardens, vineyards, etc., and, while avoiding the direct rays of the sun, are light-loving creatures.

They are very prolific, and adapt themselves to circumstances of climate and environment in a remarkable way. In this country they are found, since the ground was cultivated and enclosed, on hedge-

banks and old walls in abundance. They are sometimes found climbing trees and hedgerows, and at Lisdoonvarna Spa, in co. Clare, I found abundance of our *H. nemoralis* quite high up in a thorn hedge. At Corbeyrier-sur-Aigle, in the Rhone Valley, at an altitude of 2,500 feet, I found the same species in an orchard, a long way up the apple-trees, and I had to get a long pole with which to push them off.

They colonize freely, and *H. nemoralis* is said to have increased rapidly since it was introduced into North America.

Most writers assign the following nine species to *Tachea* :—

- Helix atrolabiata* Krynicki.
- Helix vindobonensis* C. Pfeiffer.
- Helix nemoralis* Linné.
- Helix hortensis* Müller.
- Helix sylvatica* Draparnaud.
- Helix coquandi* Morelet.
- Helix splendida* Draparnaud.
- Helix aimophila* Bourguignat.
- Helix vicaria* Westerlund.

Besides these, *H. gibbosula* Desh. and *H. filosa* Desh., both of unknown habitat, may be synonymous with one of the above species; while *H. litturea* Pfr., also with habitat unknown, is perhaps a form of *H. sylvatica*.

H. (Tachea) atrolabiata Krynicki.—

This species is the largest of the section, and its distribution is in the Caucasus, Georgia and Imeretia, and in Persia, along the southern shore of the Caspian Sea.

This species varies considerably; the var. *lenkoranea* Mouss., looked at from above, might almost be taken for a form of our common *H. aspersa*, but it has the mouth of a true *Tachea*, whereas the var. *nemoraloïdes* Mart. looks like a glorified *H. nemoralis*.

H. (Tachea) vindobonensis C. Pfr. = *austriaca* Muhl.—

This species is very like our *H. nemoralis*, but is more globose and strongly striate, with the usual five bands; it is also found without bands (var. *expallescens* Zglr.).

It is found in Central and Eastern Europe as far as the Caucasus. It seems to live in the districts where *H. nemoralis* has so far not yet penetrated, although on the borderland the two species are found together, but apparently it is being driven further east by the more dominant *H. nemoralis*.

H. (*Tachea*) *nemoralis* Linné.—

This species occurs very plentifully in nearly all parts of the United Kingdom, having been found in every county in England and Ireland, and in Scotland as far north as a line drawn from Kincardineshire on the east coast to the Island of Lismore on the west.

On the continent it is found all over Germany and Austria, except in Transylvania, and has spread into Western and Southern Russia. It is found all over Switzerland; Italy, except the extreme south; in France, though not so far recorded from some of the central departments; in Spain and Portugal; and there is a record by Dr. Kobelt from Algeria. It is also found in Belgium, Holland, Denmark, the southern part of Sweden, and in the western part of Norway, as far north as Bergen. It has been introduced into the United States, first, I believe, at Lexington, Virginia, where it has spread considerably, and subsequently into New Jersey, Pennsylvania, Massachusetts, while Prof. Cockerell records it in Colorado. It has also been introduced into Canada, and is spreading there. It has also been recorded from New Zealand.

Mr. J. W. Taylor in his Monograph considers it a dominant species, the advance guard of which is steadily extending its territory and gradually dispossessing from the regions they occupy the closely-allied yet earlier evolved and therefore comparatively weaker and less dominant species—*vindobonensis*, *sylvatica*, and *hortensis*.

The largest specimens I have taken were from the Island of Inishmore, one of the Aran Isles in Galway Bay, and from Ballyvaughan and Black Head, co. Clare. On a visit to the Isle of Inishmurray, off the coast of Sligo, we found a quantity of very large ones, but on the mainland opposite, at Streedagh Point, the shells were very small and utterly unlike the Inishmurray ones.

The var. *minor* has been found in different parts of the country; I have specimens from Miller's Dale, Derbyshire; Start Point, South Devon; and Valencia Island, co. Kerry.

The colour is very variable, although the var. *libellula* and the var. *rubella* are the commonest, but in some districts var. *castanea* is plentiful. In some places you find the different colours living together on one bank, and from near Limerick I have received the most variable series as regards colour that I have ever seen. On the continent they are also very variable in colour, although there are in some districts very few, except the var. *libellula*; but in the Pyrenees they seem to vary a great deal. Dr. Cæsar Boettger writes me that he considers that they are, as a rule, more brilliantly coloured the further west they are found; certainly the brightest colours are from the West of Ireland.

Normally, *Tachea nemoralis* has a black or dark-coloured lip, but is in some districts very often found with a white lip, like *T. hortensis*. In Ireland, where I have found in some places large quantities of the var. *albolabiata*, they have sometimes by the older collectors been taken and recorded as *hortensis*. At Middletown, Bunbeg, co. Donegal, we took this species, both with white and dark mouths in all the different band-formulas including even (12345) var. *coalitā*. It is also found occasionally with yellow, rose, violet, or brown lip; but often these colours fade considerably.

The band-formula is very variable. According to some who have had the opportunities of extensively breeding this species, the tendency is for the banded or unbanded forms to resemble their parents, and if this is so, how are we to account for the occurrence of such variation in colour and banding on one single bank or hedge-row?

One of our members, the late R. D. Darbshire, was I believe the first to record some very heavy shells of this species from a Holocene deposit at Dog's Bay, Connemara, and on my two visits there I collected a large quantity of them. They are a very heavy solid shell, and have been identified by Herr Clessin as the *H. tonnensis* of Sandberger.

There is a considerable number of records of the monst. *sinistrum* Fér. of this species. I have been fortunate enough myself to take two alive, one near Ballyvaughan, co. Clare, and another at Corbeyrier-sur-Aigle, Rhone Valley. A great many examples have been found near Bundoran, co. Donegal—according to Mr. R. Welch, over 2,000 specimens, mostly Holocene, but they are still found there alive, as when I was there with the late Dr. Chaster, he was fortunate enough to find a living one. Nearly all the specimens that I have of this form from Bundoran are 12045, which is a rather unusual band-formula.

H. (Tachea) hortensis Müller.—

This species approaches the preceding one very nearly, and was for a long time considered only a variety of it. It is distinguished from *H. nemoralis* by its smaller size, more compact shell, white aperture, and generally thinner and more glossy shell. It is also not so brilliantly coloured, although I have taken some very red var. *incarnata* Picard, on nut bushes at Corbeyrier.

There is also less variation in the band-formula, as the bulk of the specimens found are 00000 or 12345; whilst 00300—very common in *H. nemoralis*—is in this species comparatively rare.

It extends much further north than *H. nemoralis*, as it has been found in almost every county in England and Scotland, as far north

as the Shetland Isles. In Ireland it is recorded from a good many counties, although I think, with Mr. J. W. Taylor, that a good many of the older records are a mistake for the var. *albolabiata* of *H. nemoralis*. It is found all over Central Europe; France, except some of the Central Provinces; Spain, in the north-eastern portion; but the records from Italy are thought to be, again, the var. *albolabiata* of *H. nemoralis*, as no recent finds have been reported from there. It is found in Austria and Bosnia, but not in Transylvania, and in Russia it is found in the Baltic Provinces, and has been reported from South Russia. In Norway it has been found up to latitude 64° north; also in Sweden and Denmark; and Dr. O. A. L. Mörch records it from Iceland. It is reported to have been found in Greenland; and occurs in Eastern North America, from Nova Scotia, New Brunswick, Prince Edward Island, and along the western coast of Newfoundland to Maine, Connecticut, and Massachusetts in the United States. It has also been found in the Pleistocene Clays of Maine, so that it cannot have been a recent introduction. Scientists think that it may have extended its range into America through the land connection, believed by many to have joined North-West Europe to North America during Tertiary times, and by means of which a few other species have probably reached Eastern North America. There is also a record from New Zealand, evidently introduced.

Where found, it is generally abundant, and after rain in some Devonshire lanes I have found it in abundance, where at ordinary times it was very difficult to find a single specimen.

The colour of the lip is generally white, but it is sometimes found in intermediate shades of brown to black; it is noteworthy that in those with coloured lip the colour generally fades if kept for any time, whereas this does not often occur in *H. nemoralis*. The colours of var. *lilacina* and var. *incarnata* fade very much.

If a collector is in doubt whether a shell is this species, or var. *albolabiata* of the preceding one, the best thing to do, if it is the right season, is to examine the gypsobelum or love-dart, as they are quite distinct in the two species.

H. (Tachea) sylvatica Drap.—

This is only found in the Alpine districts of France and Switzerland and the Upper Rhine Valley. It is found in somewhat the same situations as *H. hortensis*, e.g., at Martigny in the Rhone Valley; I have taken it in large quantities on a grassy bank, along with var. *alba*, but I did not find it so high in the mountains as *H. nemoralis* or *H. hortensis*.

H. (*Tachea*) *coquandi* Morelet.—

This and the next species seem to connect *Tachea* with the *Macularia* group.

It is only found in Morocco and Southern Spain. It is a more depressed shell than the preceding species, and is generally, though not always, found without bands, and of a brown or rosy colour.

H. (*Tachea*) *splendida* Drap.—

The peristome and aperture are sometimes rose tinted within. A lovely species, connected with the smaller *Macularie*, and as far as shell characters go, intermediate between the two groups.

Locality : Spain and Southern France.

It is a more depressed shell than any other of the section and it is also the smallest.

H. (*Tachea*) *aimophila* Bourg.—

Locality : Asia Minor.

Unfortunately, I have never seen this species. It seems to be a thick, heavy, chalky-white shell, something like *H. desertorum*, but more globose, and adapted for life in a hot, sunny district.

Kobelt has this species amongst the *Tacheas* with a ? in front of it, and the locality Abruzzi, so that there is evidently some doubt about this species.

H. (*Tachea*) *vicaria* Westerlund.—

This species was described by Westerlund in 1894, but I have not seen a description, though I understand it is something like our *H. hortensis*, and is found in Greece and Turkey-in-Europe.

Shells from the Rhone Delta.—In April, 1912, I had the opportunity of visiting the Salin of Geraud in the Delta of the Rhone. One evening, walking along the main river, I noticed a small pocket of rejectamenta, and picked up two handfuls, and on reaching home this material was sorted out and found to contain thirty-two species of shells, all common to the Rhone Valley, but some strangers to Comargue. The following shells were obtained :—*Vitrea alliaria* (Müll.), *Euconulus fulvus* (Müll.), *Helicella virgata* (Mont.), *H. barbara* (L.), *H. ventricosa* (Drap.), *H. pyramidata* (Drap.), *Vallonia pulchella* (Müll.), *V. costata* (Müll.), *Helix pisana* (Müll.), *H. vermiculata* (Müll.), *Carychium minimum* (Müll.), *Cochlicopa lubrica* (Drap.), *Cecilioides acicula* (Müll.), *Cyclostoma elegans* (Drap.), *Clausilia parvula* (Stud.), *Bulinus quadridens* (Drap.), *Pupa doliolum* (Drap.), *P. pyrenearia* (Mich.), *P. avenacea* (Brug.), *P. secale* (Drap.), *P. cylindracea* (DaC.), *P. ringens* (Mich.), *P. muscorum* (L.), *Vertigo pusilla* (Müll.), *V. pygmaea* (Drap.), *V. minutissima* (Hartm.), *Succinea oblonga* (Drap.), *Valvata cristata* (Müll.), *Bythinia tentaculata* (L.), *Planorbis spirorbis* (L.), *P. complanatus* (Drap.), *Limnaea pereger* (Müll.), and *L. truncatula* (Müll.).—B. R. LUCAS (*Read before the Society*, October 13th, 1912).

ADDITIONS TO "BRITISH CONCHOLOGY."

BY J. T. MARSHALL.

PART VII. (*continued from p. 77*).

P. sulcatus Müll.=*P. aratus* Gmel.—Between the Orkneys and Shetlands, 85-145f., several specimens, and midway between the Shetlands and Norway, 197f. (Simpson)!

P. varius var. *purpurea* Jeff.—Various Clyde records of this shell are referable to purple specimens of the type, and not to the true var. *purpurea*.

P. opercularis var. *audouinii* Payr.—Gairloch, 20f. In this variety the ribs are vaulted and beautifully imbricated, but I do not consider its oval shape to be more than an individual character, as this varies equally with the type. Var. *audouinii* is the form usually found in the Red Crag deposits, and is well figured by Searles Wood.¹

P. pes-lutræ L.—The monstrous valve recorded by Gwyn Jeffreys² is not unique. I have a perfect specimen from the Shetlands, Mr. A. Somerville dredged two more at Oban, and Mr. J. Simpson has another of the var. *septemradiatus* from E. Shetlands. A similar monstrosity also occurs in *P. tigrinus*, but is less rare.

P. tigrinus Müll.—Herring nets are a prolific source of supply for this species. The largest come from the Doggerbank and the Moray Firth, and attain an inch in length and breadth.

P. similis Lask.—This tiny *Pecten* is very largely consumed by haddocks, who swallow them in large numbers while they flit about in the open sea, as is their habit. Any one who does not mind handling the offal of haddocks will find himself well rewarded. White specimens are rare; I have two or three only from the Shetlands.

Amussium hoskynsi Forb.—Between the Orkneys and Shetlands 145f., two specimens and some valves; off the Shetlands 155f., a valve; and between the Shetlands and Faroes 131f. (Simpson)! It has also been dredged off the Butt of Lewis in 530f. by the 'Knight Errant,' and north of the Shetlands in 345f. by the 'Porcupine.'

Lima sarsii Lov.—Dredged by the Scottish Fishery Board in the North Sea 53f., a valve; between the Orkneys and Shetlands 145f., and off the Shetlands 155f., several specimens and many valves (Simpson)! Also by H.M.S. 'Sylvia' in the Straits of Korea 20-50f. (!)

L. hians var. *tenera* Turt.—Alderney (Marquand)!

¹ Crag Moll., vol. ii., tab. 6, fig. 24, p. 36.

² Brit. Conch., vol. ii., p. 64.

L. subovata Jeff. has been dredged in the Atlantic off Ireland in 1366f., and off the Butt of Lewis in 542f., by the 'Porcupine'; also in the Shetland-Faroe Channel, in 570f., by the 'Triton.'

Mytilus edulis L.—In 1901, when the lightship at Boston, in Lincolnshire, was put on the gridiron for overhauling, no less than six tons of mussels were taken from her keel and sides. The propensity of *Mytilus* to attach itself to the sheathing of ships is a fruitful cause of food poisoning, though the latter may also arise from the practice of taking mussels from the open sea and placing them in contaminated waters to fatten or as a preserve for bait. There are many forms of ptomaine or food poisoning in all preserved or stale provisions, but that inherent in *Mytilus* is a perfect example of true ptomaine poisoning, being caused by a ptomaine known as "mytilotoxin," which has its source in stagnant waters and is generated in the unusually large liver of the animal. Gwyn Jeffreys wrote that "the 'faculty' seems completely at fault as to the nature of this poison,"¹ but it is now known that mytilotoxin is a specific micro-organism, highly dangerous, and may be acquired from eating either cooked or uncooked mussels—so dangerous, indeed, that in acute cases fatal results may ensue within two or three hours of their consumption. It has been found fatal to animals if given by the mouth, although quite innocuous if injected into the circulation.

Grown under careful supervision and with proper care, however, mussels are an excellent food. Those in most repute come from the beds of St. Valéry-sur-Somme, and especially from the bay of L'Aiguillon, where it is said that mussels have flourished for more than 800 years, and their consumption in Paris alone is estimated to be worth nearly 10,000,000 francs per annum. They are palatable and nutritious even in the wild state, but on the mud flats of St. Valéry, which comprise hundred of acres, mussel culture has been brought to such a state of perfection that the artificial breeding, rearing and fattening of the mussels, on the same principles which obtain in ostreaculture, has brought them to a high degree of perfection.

The rate of production is enormous, and is estimated at 300-fold per annum. The brood mussels are brought from the sea bed and laid down on prepared grounds, which are set with interlaced rows of stakes; in due season they spawn plentifully, and the spat, finding a congenial environment, with an admixture from the sweet waters of the Somme, grow rapidly, and at the end of a year the germ can be brought to those points of size, colour and flesh which enable it to be sent to market, developing in that interval into full-grown mussels 3in. in length by half that width, free from disease or blemish

either in shell or flesh, the latter being white, fat, full, and succulent. Its only natural enemy appears to be the crab, which finds it an easy prey.

It has been found that in the hardest frost the mussels become frozen but do not die, as they thaw and melt on a rising temperature, and seem none the worse for it. Not so the oyster, which is killed off by frost. It also bears greater heat and exposure than the oyster. Mussels, in fact, appear to be particularly tenacious of life, as a cart-load of them, which had been shot into a hole and covered with two feet of clay because they were all thought to be dead, were found some weeks later alive and thriving, and working their way out of the clay mass in which they were embedded.

var. **incurvata** Penn.—This variety is not always “stunted and bent,” and “filling crevices of rocks;” on some coasts it lives attached by a byssus only; in this state it is small and narrow, beautifully rayed, and curved like the blade of a scythe; hence the name.

var. **pellucida** Penn.—Among some beautiful specimens of this variety which were taken from the bottom of a barge at New Ferry by Mr. A. Leicester, a portion possess some peculiar features. Instead of being “less gibbous” than the type, they are much more so, the umbonal area especially being swollen to the same extent as in *M. modiolus*, and, like that species, the anterior end of the shell is broadly rounded and swollen, instead of forming a point. In outward form they would answer for either species.

var. **pallida** Marsh. must be substituted for var. *flavus* Poli, to which I attributed it in error. Poli’s shell is brownish-yellow, and hardly a variety, though it is found occasionally on our coasts. Var. *pallida* is straw-colour or colourless. Another form sometimes found on our coasts is smaller, narrower, and proportionately longer; this is var. *elongata* S. Wood, from the Crag. I have it from Southampton Water.

M. modiolus var. **ovata** Jeff.—Tenby (Span)!

var. **cylindrica** Marsh.—This is well figured as an elongated variety in Crag Mollusca, vol. ii., tab. viii., figs. 1c, d.

M. barbatus L.—The Bute record of Mr. Wotton is an error, his shell being *M. modiolus*. Other Clyde records given in Brit. Assoc. Handbook (1901) are most probably equally erroneous, and the determination not only of this species, but of many others in that list, should not be accepted without confirmation.

Adula (Myrina) simpsoni Marsh.—Described and figured in Journ. Malac., 1900, vol. vii., p. 167 (woodcuts); and vol. viii., p. 19.

Modiolaria marmorata Forb.—Frith of Forth, living at low water (Jeffreys).

Cantraine's specific name *subpicta* has precedence of *marmorata* by three years, and that given by Say (*lateralis*), if applicable to the present species, is still older ; but *marmorata* is now in general use.¹

M. costulata Risso.—Alderney (Marquand) ! Swansea (Jeffreys) ; Freshwater West (Vaughan and J.T.M.). I once found a valve among some northern shells gathered on the beach at Durness in Sutherlandshire, and although this valve was beach-worn like the rest, there is a possibility of error. *M. costulata* is almost exclusively southern, the only exceptions being the Welsh ones recorded above.

M. discors var. **semilævis** Jeff.=var. *lævigata* Gray=var. *substriata* Gray=var. *lævis* Beck.—Benbecula Sound 10f.

All the preceding names are scarcely required for the same form ; they only differ in colour or degree of sculpture, which is extremely variable even among specimens living together. At one extreme, Jeffreys' variety is small and yellowish-green, while at the other Gray's is large and purplish-black, caused merely by a difference of environment. I have all these four forms, besides the type, from Arctic localities.

M. nigra Gray.—This species, as well as several other *Modiolaria*, British and foreign, has been given the name of *discrepans*. They attain a large size on the Doggerbank and off Aberdeen, reaching up to 2¾ in. in width.

Crenella pellucida Jeff.—Adventure Bank 92f. ('Porcupine') ! Sooloom Bay, Tripoli 120f. (Shearwater) ! Even this mite of a bivalve is occasionally pierced by a gastropod, which leaves little more than the margins of the shell.

Nucula sulcata Bronn.—Pladda, Clyde, 33f., abundant and fine (Knight) !

N. nitida var. **radiata** Marsh.—This is figured by Jeffreys as a "streaked variety."²

N. tumidula Malm has been dredged off the Butt of Lewis in 545f. by the Scottish Fishery Board (Simpson) ! and in the same district in 530f. by the 'Knight Errant.'

N. corbuloïdes Seg. was also dredged with the preceding species by the 'Knight Errant,' and in the Atlantic off Ireland by the 'Porcupine.' Sowerby gives a figure under this name,³ but it has no resemblance to the actual shell.

A valve of *Malletia obtusa* M. Sars, a rare species, has been dredged by the Scottish Fishery Board in 197f., midway between the Shetlands and Norway (Simpson) !

Leda pusilla Jeff.⁴—S. W. Ireland 30-40f. (R. I. A. cruise) ; Antrim (Chaster).

¹ Jeffreys : Moll. 'Lightning' and 'Porcupine,' P.Z.S., 1879, p. 568.

² Brit. Conch., vol. v., pl. xxix., fig. 3a.

³ Illus. Ind. Brit. Shells, pl. xxvi., fig. 17.

⁴ Jeffreys, Proc. Zool. Soc., 1879, p. 580, pl. xlv., fig. 6 ; Chaster, Irish Naturalist, May, 1897, vol. vi.

L. lucida Lov. has been dredged off the Butt of Lewis in 530f. ('Knight Errant'), and midway between Shetland and Norway in 197f. (Simpson)!

L. lenticula Möll.—Off Loch Ryan 24f., three valves.

L. frigida Torell.¹—Off the Butt of Lewis 530f. ('Knight Errant'); S.W. Ireland 345f. (R.I.A. cruise). I have three valves of this species dredged off Loch Ryan in 25f., another valve from Eigg Island in 20f., and another from the Mull of Cantire in 26f. (The Eigg Island valve I had already recorded as *L. lenticula* by error in *Journ. of Conch.*, 1897, vol. viii., p. 344). Though apparently recent, these valves may be fossil or semi-fossil. They are larger and coarser in every way than Arctic or 'Porcupine' specimens. *L. frigida* has a very wide range, and is a Glasgow post-tertiary fossil.

Leda? sp.—A valve of another species of *Leda*, from off Loch Ryan in 25f., is intermediate between *L. frigida* and *L. tenuis*, but distinct from both.

Limopsis aurita Brocc.—S.W. Ireland 345f. (R.I.A. cruise); off the Shetlands 155f. (Simpson)!

L. minuta Phil.—*L. borealis* Woodward MS.—A genuine British species; it has been dredged between the Orkneys and the Shetlands in 145f. (Simpson)! Also the Faroe Channel, 516f., with *L. cristata* ('Triton')! Atlantic off Ireland and off the Scillies, with *L. aurita* ('Porcupine').

L. cristata Jeff.—Several living specimens and half-a-dozen valves were dredged 80-90 miles N.W. of the Butt of Lewis (lat. 59° 36", long. 7° W.) in 545f., during a cruise of the Scottish Fishery Board in 1906 (Simpson)!

Pectunculus glycymeris var. **nummarius** Turt.—A figure of this variety is given by Forbes and Hanley.²

Arca pectunculoïdes Scacc.—Straits of Korea 40f. (H.M.S. 'Sylvia')!

A. obliqua Phil.—Between the Orkneys and Shetlands 145f., valves only; and off the Shetlands 155f., valves only (Simpson)!

A. lactea L.—Straits of Korea 40f. (H.M.S. 'Sylvia')!

A. nodulosa Müll.—Between the Orkneys and Shetlands, 145f., a perfect specimen and several valves; off the Shetlands, 155f., another specimen; and between the Shetlands and Færoes, 131f. (Simpson)! Shetland-Faroe Channel 570f. ('Triton')! The record of Mr. Frank Coulson of "a living specimen off East Shetlands in 1886," was erroneous.

(To be continued).

¹ Spitzbergen Moll., p. 148, tab. 1, fig. 3.

² Brit. Moll., vol. iv., pl. xlvii., fig. 4.

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- 1.—This Society shall be called "**The Conchological Society of Great Britain and Ireland.**"
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- 1899. Bladen, W. Wells, Stone, Staffordshire.
- 1897. Blake, Wm. Charles, 2, Acacia Villas, Ross, Herefordshire.
- 1895. Bles, Edward J., M.A., D.Sc., Elterholm, Madingley Road, Cambridge.
- 1897. Bliss, Joseph, Boar Bank Hall, Grange-over-Sands.

1907. Bloomer, H. H., 35, Paradise Street, Birmingham.
 1899. Blundell, Mrs. Jessie M., Argyll House, Cirencester.
 1912. Bonner-Chambers, T., Huccombe, Stokenham, Kingsbridge.
 1910. Booker, H. H., 153, Albert Road, Heeley, Sheffield.
 1904. Booth, Fred, 18, Queen's Road, Shipley, Yorks.
 1884. Bostock, Edwin D., Oulton Cross, Stone, Staffordshire.
 1906. Boulton, J. W., 50, Washington Street, Newland, Hull.
 1897. *Z* Boycott, Professor A. E., 27, Rathen Road, Withington, Manchester.
 1908. Brainerd, Mrs. H. D., Captiva, Lee Co., Florida, U.S.A.
 1909. Brindley, G. W., Milford, near Derby.
 1900. *Z* Broadbent, Dr. G. H., 8, Ardwick Green, Manchester.
 1899. Brooksbank, Hugh, M.B., College Road, Windermere.
 1905. Bromehead, C. N., Beverston Rectory, Tetbury.
 1911. Brown, Edmund R., 235, Brunswick Street, Manchester.
 1913. Bryan, B., 176, Uttoxeter Road, Longton, Staffs.
 1897. Burnup, Henry Clifden, Box 182 P.O., Maritzburg, Natal.
 1879. Butterell, J. Darker, Manor House, Wansford, Hull.
 1906. Butterfield, W. Ruskin, Corporation Museum, Hastings.
 1902. Button, Fred. L., Bacon Building, Oakland, California, U.S.A.
1906. *Z* Carpenter, Geoffrey D. H., B.A., M.B., c/o P.M.O., Entebbe, Uganda.
 1913. Carr, Professor G. W., University College Museum, Nottingham.
 1901. Carter, Chas. S., 8, Bridge Street, Louth, Lincs.
 1878. *P* Cash, William, F.G.S., F.R.M.S., 35, Commercial Street, Halifax.
 1903. Cattell, W. Chas., The Poplars, Montagu Street, Kettering.
 1913. Chalmers, J., c/o The Hon. Secretary.
 1892. Champ, Hy., c/o S. & J. Watts & Co., Portland Street, Manchester.
 1905. Charnley, Jas. Roland, F.Z.S., F.E.S., The Avenue, Moor Park, Preston.
 1889. Christy, Robert Miller, F.L.S., The Blue House, Chignal St. James, Chelmsford, Essex.
1904. Clapp, Geo. H., Corner 7th & Bedford Aves., Pittsburgh, Pa., U.S.A.
 1913. Clapp, W. F., 25, Ware Street, Cambridge, Mass., U.S.A.
 1886. Coates, Henry, F.R.S.E., Corarder, Perth.
 1880. Collier, Edwd., Glen Esk, Whalley Range, Manchester.
 1898. *PZ* Collinge, Walter Ed., M.Sc., F.L.S., F.E.S., 8, Newhall St., Birmingham.
 1913. Connolly, Major M., 18, Brompton Square, London, S.W.
 1901. Cooke, Rev. Alfred H., M.A., Aldenham School, Elstree, Herts.
 1892. Cooper, James Eddowes, Cadboro, 53, North Road, Highgate, N.
 1890. Crawford, James, c/o J. C. Kemsley and Co., Port Elizabeth, Cape Colony.
 1910. Cribb, C. Theodore, The Vicarage, Shipley, Yorks.
 1899. Crowther, J. E., Portland Street, Elland, Yorks.
1897. Dacie, John Charles, 30, Montserrat Road, Putney, S.W.
 1913. Dalton, E. N., 62, The Avenue, Highams Park, Chingford.
 1899. Darnbrough, Frederick, 12, West End Terr., Yarm Rd., Stockton-on-Tees.
 1913. Davey, W. J., 19, Allfarthing Lane, Wandsworth Common, S.W.
 1909. Dawes, L., Hambledon, Hants.
 1898. Dean, J. Davy, 84, Dale Street, Lancaster.
 1909. Dickson, Robert Cecil, M.B., Ch.B., 31, Castle Street, Dumfries.
 1909. Diver, Cyril, The Birches, Haslemere.
 1907. Dupont, Evenor, Hell-Bourg, Réunion.
 1910. Dyke, F. M., B.Sc. (Lond.), Nelson Croft, Church Rd., Bebington, Cheshire.

1908. Edgar, H. F., 14, Woodside Park Gardens, North Finchley, N.
 1895. Edwards, Thos., 247, Narborough Road, Leicester.
 1901. Edwards, W. H., Hastings Museum, Victoria Institute, Worcester.
 1891. Elgar, Hubert, Museum and Public Library, Maidstone.
 1904. *L* Eliot, Sir Chas., K.C.M.G., Endcliffe Holt, Endcliffe Crescent, Sheffield.
 1884. Elliot, Edward J., High Street, Stroud, Gloucestershire.
 1910. Elliott, W. T., D.D.S., F.Z.S., Tanworth-in-Arden, Worcs.
 1913. Emmett, H., 156, Moston Street, Hanley, Staffs.
 1894. Evans, Wm., F.R.S.E., 38, Morningside Park, Edinburgh.

 1897. *L* Farquhar, John, 3, Rose Terrace, African Str., Grahamstown, Cape Colony.
 1891. Farrer, Captain Wm. James, Chapel House, Bassenthwaite, Keswick.
 1897. Fielding, Clement, M.P.S., Clover Hill, Halifax, Yorks.
 1890. Fierke, Frederick Wm., 581, Anlaby Road, Hull.
 1884. *L* Fitzgerald, Rev. H. Purefoy, F.L.S., Lidwells, Goudhurst, Kent.
 1906. Fogerty, Harry, Chamber of Commerce, Limerick.
 1913. Fordred, Mrs. E., Wychmont, St. Bernard's, Olton, Warwickshire.
 1905. Foster, Miss Amy C. S., Hendra, Alum Chine, Bournemouth.
 1912. *L* Frames, P. R., P.O. Box 148, Johannesburg, S. Africa.
 1905. Freeman, William, Hawkhurst, Milton Road, Oundle.
 1906. Freyberg, Cuthbert, 27, Hawker Street, Wellington, New Zealand.
 1892. Fulton, Hugh, River Side, Kew, near London.
 1913. Fysh, Greevz, 78, Chapel Allerton Terrace, Leeds.

 1907. *L* Gabriel, Charles J., 297, Victoria Street, Abbotsford, Victoria, Australia.
 1913. Gauntlett, H. L., M.R.C.S., L.R.C.P., A.K.C., Merton Cottage, Bloxham.
 1911. Geiser, Samuel W., Upper Iowa University, Fayette, Iowa, U.S.A.
 1887. Gerland, Conrad, M.Sc., Ph.D., F.C.S., Meadow Bank, Accrington.
 1908. Gill, Mrs. A. E., Dinant Cottage, 1, Claude Road, Chorlton-cum-Hardy.
 1910. Gnospelius, Miss Hilda T., Silver Holme, Newby Bridge, Ulverston.
 1886. *L* Godlee, Theo., Whips Cross, Walthamstow, Essex.
 1897. *P* Godwin-Austen, H. H., Lt.-Col., F.R.S., etc., Nore, Hascombe, Godalming.
 1906. Gomez, A. da Costa, 201, St. James' Place, Brooklyn, N.Y., U.S.A.
 1904. Gray, Arthur F., 509, Exchange Buildings, Boston, Mass., U.S.A.
 1905. Green, Wm. A., 4, Salisbury Terrace, Chichester Park, Belfast.
 1904. Grierson, P. H., Kilcarberry House, Clondalkin, Dublin.
 1907. Gripper, F. H., Springfield, Camden Park, Tunbridge Wells.
 1890. Gude, G. K., F.Z.S., 9, Wimbledon Park Road, S.W.
 1886. *P* Gwatkin, Rev. Prof. H. M., D.D., M.A., 8, Scrope Terrace, Cambridge.
 1907. Gwyer, C. D., 303, Putnam Avenue, Brooklyn, N.Y., U.S.A.
 1907. Gyngell, Walter, 51, Gladstone Street, Scarborough.

 1909. Haas, Dr. Fritz, Senkenbergisches Museum, Victoria Allee, 7, Frankfurt-am-Main.
 1910. Hadden, Norman G., St. Audrey's, Priory Road, Malvern.
 1895. Hann, Rev. Adam, 1, Park Terrace, Halifax.
 1895. Hardy, John Ray, The Museum, The University, Manchester.
 1887. Hargreaves, J. A., 2, Stepney Road, Scarborough.
 1913. Harman, A., 5, Harley Street, Scalby Road, Scarborough.
 1909. Harrison, Richard, 28, Allen Street, Hulme, Manchester.

1904. Harrison, Russell C., 13, Foulser Road, Upper Tooting, S.W.
 1889. Hartley, Alfred, 19, Thorpe Garth, Idle, near Bradford, Yorks.
 1887. Harvard, T. Mawson, 4, Queen's Leaze, Forest Hill, S.E.
 1907. Hawkins, H. L., University College, Reading.
 1903. Hawkins, John, J.P., 35, Avenue Road, Grantham.
 1887. Heathcote, Wm. Henry, F.L.S., 119a, Fishergate, Preston, Lancs.
 1907. Henderson, J. B., jr., 16th Street and Florida Avenue, Washington, D.C.,
 U.S.A.
 1913. Heller, Julius, Villa Gisela, Teplitz, Bohemia.
 1887. Hey, Thomas, 8, Bloomfield Street, Derby.
 1895. Hibbert, Charles R. C., Riccard's Down, Abbotsham, Bideford, Devon.
 1895.^P Hickson, Prof. Sydney J., D.Sc., M.A., F.R.S., University, Manchester.
 1893. Hill, John, Pike's Villa, Little Eaton, near Derby.
 1886.^L Hillman, Thomas Stanton, Eastgate Street, Lewes, Sussex.
 1907. Hindley, R. T., The Green Way, Macclesfield.
 1906. Hirase, Y., Karasumaru, Kyoto, Japan.
 1911. Hitchon, Mrs. Susan A., Rhyddington, Oswaldtwistle, Lancs.
 1891.^P Horsley, Rev. Canon J. W., Detling Vicarage, Maidstone.
 1907. Horwood, A. R., Ivanhoe, Gwendolen Road, Leicester.
 1907. Howard, Vernon, Carlton Lodge, Eastgate, Louth.
 1884. Howell, George O., 210, Eglinton Road, Plumstead, Kent.
 1892. Howorth, Sir Henry Hoyle, K.C.I.E., M.P., F.R.S., etc., 30, Collingham
 Gardens, London, S.W.
 1886.^P Hoyle, W. E., M.A., D.Sc., The National Museum of Wales, Cardiff.
 1895. Hudson, Rev. Hy. A., 445, Stretford Road, Manchester.
 1909. Huggins, Henry C., 17, Clarence Place, Gravesend.
 1911. Humphreys, Griffith, 1, Belsize Avenue, London, N.W.
 1905. Hutton, W. Harrison, 44, Dial Street, Leeds.
1913. Ingrams, W. H., The School House, Shrewsbury.
1901. Jackson, J. Wilfrid, F.G.S., The Museum, The University, Manchester.
 1912. Jenkinson, Charles, 1, High Street, Kettering.
 1891. Jenner, James Herbert Augustus, F.E.S., Eastgate House, Lewes.
 1912.^L Jewell, Miss F., Ensworth, Hants.
 1906. Johnson, Chas. W., Boston Society of Natural History, Boston, Mass.,
 U.S.A.
 1908. Jolliffe, J. E. A., Keble College, Oxford.
 1894. Jones, Fleet-Surgeon K. H., M.B., Ch.B., F.Z.S., R.N., c/o Admiralty,
 London, S.W.
 1901. Jukes Browne, A. J., F.R.S., F.G.S., Westleigh, Ash Hill Road, Torquay.
1907. Kendall, Rev. C. E. Y., 190, Lincoln Road, Peterborough.
 1897.^L Kennard, A. S., Benenden, Mackenzie Road, Beckenham, Kent.
 1902.^L Kensett, Percy F., Broadmeadow, Coombe Lane, Wimbledon, S.W.
 1897. Kenyon, Mrs. Agnes Fleming, 291, Highett St., Richmond, Melbourne,
 Victoria.
 1889. Knight, Rev. G. A. Frank, M.A., F.R.S.E., St. Leonard's Bank, Perth.

1901. Laidlaw, F. F., M.A., Cranston's Ivanhoe Hotel, Bloomsbury St., London, W.C.
 1899. Lancaster, Ernest Le Cronier, B.A., M.B., Winchester House, Swansea.
 1879. Laver, Henry, M.R.C.S., F.L.S., Head Street, Colchester, Essex.
 1894. *L* Lawson, Peter, Jesmond Dene, 87, Finlay St., Fulham, S.W.
 1905. Laycock, John, Sidney, Manitoba, Canada.
 1900. Lebour, Miss M. V., Radcliffe House, Corbridge-on-Tyne, Northumberland.
 1911. Leman, George C., Wynyard, 152, West Hill, Putney, S.W.
 1910. Levett, Rev. T. T., F.Z.S., Frenchgate, Richmond, Yorks.
 1899. Lightfoot, Robert M., South African Museum, Cape Town.
 1909. Linton, Mrs., Ye Olde Mill House, Castle Hill, Northallerton.
 1908. Longstaff, Mrs. G. B., F.L.S., Highlands, Putney Heath, S.W.
 1912. Loyd, L. R. W., 17, Sandringham Court, Maida Vale, W.
 1898. Lucas, B. R., Winnington Park, Northwich, Cheshire.
 1910. Lucas, F. R. Tindall, Tewin Vale, Welwyn.
 1891. Lyons, Lady, Kilvrough, Parkmill, R.S.O., Glamorganshire.

 1889. MacAndrew, James J., F.L.S., etc., Lukesland, Ivy Bridge, Devonshire.
 1905. Macindoe, Dr. A., D.P.H., Sidmouth, Devon.
 1911. MacLeod, D. J., Hof Ter Meere, 13, Reigerstraat, Ghent, Belgium.
 1884. Madison, James, Turves Green, West Heath Rd., Northfield, Birmingham.
 1911. March, Miss M. C., M.Sc., Healey Grove, Burnley, Lancs.
 1885. Marquand, Ernest D., A.L.S., St. Mildred's Hall, Turl Street, Oxford.
 1906. Marshall, Arthur G., 66, Victoria Street, Westminster, S.W.
 1887. Marshall, J. T., c/o Editor of *Journal of Conchology*.
 1887. *P* Masefield, John R. B., M.A., Rosehill, Cheadle, Staffordshire.
 1904. Massy, Miss A. L., Tredagh, Malahide, co. Dublin.
 1905. Maxwell, Mrs. Miller, Bangholm Bower, Goldenacre, Edinburgh.
 1889. Mayfield, Arthur, Mendlesham, Stowmarket, Suffolk.
 1903. McClelland, Hugh, Stretton, Balsall Street, Berkswell, Warwickshire.
 1886. McMurtrie, Rev. John, M.A., D.D., 13, Inverleith Place, Edinburgh.
 1880. *P* Melvill, James Cosmo, M.A., D.Sc., F.L.S., Meole Brace Hall, Shrewsbury.
 1904. Milne, James N., Foylemore, St. Jude's Avenue, Belfast.
 1907. Milner, Miss Lucinda, Cleveland, Ellesmere Park, Eccles, Manchester.
 1909. Milton, J. W., Harrison House, Crosby.
 1906. Monterosato, Il Marchese di, 2, Via Gregorio Ugdalena, Palermo, Sicily.
 1910. Moorcock, J., 91, Broadfield Road, Catford, S.E.
 1902. *L* Moore, Chas. H., 103, Mottram Road, Stalybridge.
 1908. Moore, Albert J., 9, Brook Street, Hull.
 1907. Morey, Frank, F.L.S., Wolverton, Carisbrooke Rd., Newport, Isle of Wight.
 1912. Murdoch, G. H., 49, Parliament Hill, Hampstead, N.W.
 1906. Murdoch, R., Wanganui, New Zealand.
 1907. Musham, J. F., F.E.S., Haylands, Brook Street, Selby, Yorks.

 1905. Napier, H. C., 15, The Common, Woolwich.
 1911. Nash, Rev. E. H., M.A., Wetley Rocks Vicarage, Stoke-on-Trent.
 1903. Nash, P. B., Bruce Mines, Algona, Ont., Canada.

 1887. Newstead, A. H. L., B.A., 38, Green Street, Bethnal Green, E.
 1891. *P* Newton, Richard Bullen, F.G.S., 11, Twyford Crescent, Acton Hill, London, W.
 1891. *P* Norman, Rev. Canon Alfred Merle, D.C.L., F.R.S., etc., The Red House, Berkhamsted.
 1901. Norton, Miss E. M., 20, Eastfield Road, Westbury-on-Trym, near Bristol.

1887. Oldham, Charles, Kelvin, Boxwell Road, Berkhamsted.
 1910. Oliver, A. M., West Jesmond Villa, Newcastle-on-Tyne.
 1896. Overton, Harry, The Newlands, Boswell Road, Sutton Coldfield.
 1905. *L* Owston, Alan, Yokohama, Japan.
1903. Pace, S., Milneholme, Hounslow.
 1900. Pannell, Chas., 13, East Street, Haslemere, Surrey.
 1904. Parritt, H. W., 14, Stanhope Gardens, Highgate, N.
 1902. Pattison, Ernest, 52, Saxe Coburg Street, Leicester.
 1886. Pearce, Rev. S. Spencer, M.A., Long Combe Vicarage, near Woodstock, Oxfordshire.
1913. Pellon, N. E., 60, Sampson Road, Sparkbrook, Birmingham.
 1901. Penrose, G., Royal Institution of Cornwall, Truro.
 1907. Petty, S. L., Dykelands, Ulverston, Lancs.
 1908. Phillips, R. A., Ashburton, Cork.
 1913. Pickard, Bertram, Tregenna, Mansfield.
 1904. Platt, Thos. H., Harpurhey Mill, Rochdale Road, Manchester.
 1886. Ponsonby, John H., F.Z.S., 15, Chesham Place, London, S.W.
 1905. Poole, W. G., South Lawn, Godalming.
 1913. Presbrey, E. W., 17, Trinity Place, New Rochelle, N.Y., U.S.A.
 1903. Preston, Henry, F.G.S., Hawthornden Villa, Spittlegate, Grantham.
 1897. Preston, Hugh Berthon, F.Z.S., 53, West Cromwell Road, London, S.W.
 1907. Priske, R. A. R., 9, Melbourne Avenue, West Ealing, Middlesex.
 1906. *L* Pritchard, G. B., F.G.S., 38, Mantell Street, Moonee Ponds, Victoria.
1906. *L* Radley, Percy E., F.R.M.S., 30, Foxgrove Road, Beckenham, Kent.
 1899. Ramanan, Vedaraniyam Venkata, M.A., F.Z.S., 12, Sami Pillai Street, Triplicane, Madras, S. India.
1906. Reynell, Alexander, Caerleon, Whyteleafe Road, Caterham.
 1905. Reynolds, Laurence R., 233, Aspinwall Avenue, Brookline, Mass., U.S.A.
 1913. Rhodes, F., 113, Heaton Road, Manningham, Bradford, Yorks.
 1900. Richards, C. P., Mission House, Stenalees, St. Austell, Cornwall.
 1906. Ritchie, John, jr., Box 2795, Boston, Mass., U.S.A.
 1898. Roberts, A. William Rymer, The Common, Windermere.
 1913. Roberts, J. W., 145, Withington Road, Whalley Range, Manchester.
O P Roebuck, Wm. Denison, F.L.S., 259, Hyde Park Road, Leeds.
1907. Rolle, Hermann, Königgrätzer Str. 89, Berlin, S.W.
 1901. Rooth, J. A., M.R.C.S., 6, Richmond Terrace, Brighton.
 1905. Rope, Geo. T., Blaxhall, Tunstall, Suffolk.
 1893. Roseburgh, John, Market Square, Galashiels, Roxburgh.
 1892. Rosevear, John Burman, 109, New King's Rd., Fulham, S.W.
 1910. *L* Rowe, A. W., M.S., M.B., M.A.C.S., F.G.S., Shottendane, Margate.
1910. Saggi, M. K., M.R.A.S., etc., Common Room, Lincoln's Inn, W.C.
 1906. Salisbury, Albert E., 12a, The Park, Ealing, W.
 1877. *P* Scharff, Robert F., Ph.D., M.R.I.A., Knockranny, Bray, co. Wicklow.
 1906. Schepman, M. M., Bosch en Duin, Huister Heide, Utrecht, Holland.
 1895. *L* Schill, C. H., Crosten Towers, Alderley Edge.
 1886. Scott, Thomas, LL.D., F.L.S., 280, Victoria Road, Torry, Aberdeen.
 1893. Shackelford, Rev. Lewis John, 66, Granville Road, Blackpool.

1910. *Z* Shaw, H. O. N., B.Sc., F.Z.S., Skreens Park, Roxwell, near Chelmsford.
 1904. Shaw, Rev. W. A., Peper Harow Rectory, Godalming.
 1906. Sheppard, T., F.G.S., Municipal Museum, Hull.
 1906. Shopland, Commander E. R., 1, Estivals, Oulton Broad.
 1910. Shrubsole, George, Ellesmere, Fields Park Road, Newport, Mon.
 1895. Sich, Alfred, F.E.S., Corney House, Chiswick, W.
 1906. Sikes, F. H., M.A., F.L.S., Burnham Abbey, Bucks.
 1905. Simpson, James, c/o G. Sim, Esq., A.L.S., 52, Castle Street, Aberdeen.
 1902. Smallman, Raleigh S., Eliot Lodge, Albemarle Road, Beckenham.
 1886. *P* Smith, Edgar A., I.S.O., F.Z.S., 22, Heathfield Road, Acton, W.
 1892. Smith, Mrs. Louisa J., Monmouth House, Monmouth St., Topsham, Exeter.
 1899. *Z* Smith, Mrs. Lucy A., Cricklade Street, Cirencester.
 1907. Smith, Maxwell, Hartsdale, Westchester Co., New York, U.S.A.
 1894. Smith, Wm. Chas., 92, Dawes Road, Fulham, S.W.
 1900. Solly, E. H., 3, South Street, Deal, Kent.
 1886. Sowerby, Geo. Brettingham, F.L.S., River Side, Kew, near London.
 1907. Spence, G. C., 10, Pine Grove, Monton, Eccles, Lancs.
 1906. Stalley, Henry J., Thorntona, Oxted, Surrey.
 1886. Standen, Robert, The Museum, The University, Manchester.
 1911. Standish, C. M., Prospect House, Weldbank, Chorley.
 1903. *Z* Stelfox, A. W., Delamere, Chlorine Gardens, Belfast.
 1906. Step, Edward, F.L.S., Oakwood House, Ashstead, Surrey.
 1910. Stephenson, H. L., 73, Colwyn Road, Dewsbury Road, Leeds.
 1908. *Z* Stobart, H. J. S., Belbroughton, Stourbridge.
 1896. Stonestreet, Rev. W. T., B.D., F.R.S.L., c/o The New Church Book
 Depôt, 18, Corporation Street, Manchester.
 1897. Stracey, Bernard, M.B., Priory Lodge, 16, New Walk, Leicester.
 1890. Stubbs, Arthur Goodwin, The Meads Cottage, Hailey Lane, Hertford.
 1893. Stump, Edward Consterdine, 13, Polefield Road, Blackley, Manchester.
 1912. Sturt, E. G. M., Lismore, Cavendish Road, Weybridge.
 1912. Sturt, G. L., Lismore, Cavendish Road, Weybridge.
 1895. Swanton, E. W., The Educational Museum, Haslemere, Surrey.
 1888. *P* Sykes, Ernest Ruthven, B.A., F.L.S., Longthorns, Blandford.

 1910. Tattersall, W. M., D.Sc., The Museum, The University, Manchester.
 1895. Taylor, Frederick, 32, Landseer Street, Park Road, Oldham, Lancs.
 1907. Taylor, G. H., School House, Higher Blackley, Manchester.
 1904. *Z* Taylor, Gerald Medland, Rossall School, Fleetwood.
 1907. Taylor, J. Kidson, 45, South Avenue, Buxton.
 1904. Taylor, Thos., Wotea, Grafton Road, Auckland, New Zealand.
 1903. Thaanum, D., 5, Church Street, Hilo, Hawaiian Islands.
 1908. Thomas, Rev. R. E., M.A., St. Martin's Clergy House, Salisbury.
 1907. *Z* Thornton, H. G., Kingsthorpe Hall, Northampton.
 1886. *Z* Tomlin, J. R. le Brockton, M.A., F.E.S., Lakefoot, Reading.
 1906. Turton, Lt.-Col. W. H., D.S.O., R.E., 80, Caledonia Place, Clifton, Bristol.

 1907. Upton, Charles, Rooksmoor, Tuffley Avenue, Gloucester.

 1899. Vaughan, J. Williams, J.P., Pen-y-maes, Hay, *via* Hereford.
 1897. Vignal, Louis, 28, Avenue Duquesne, Paris.
 1902. Vincent, W. C. W., 39, West Bank, Stamford Hill, London, N.

1898. Wakefield, H. Rowland, 7, Montpelier Terrace, Swansea.
 1891. Walker, Bryant, 205, Moffat Building, Detroit, Michigan, U.S.A.
 1907. Wallis, E. A., Springfield, West Parade, Scarborough.
 1900. *L* Watson, Hugh, Bracondale, The Avenue, Cambridge.
 1908. Weaver, G. H., 31, Devonshire Road, Palmer's Green, N.
 1900. Webb, Walter F., 202, Westminster Road, Rochester, N.Y., U.S.A.
 1902. Weeks, Wm. H., jr., 508, Willoughby Avenue, Brooklyn, N.Y., U.S.A.
 1895. Welch, Robert John, M.R.I.A., 49, Lonsdale Street, Belfast.
 1913. Western, W. H., 9, Redearth Road, Darwen.
 1907. Wheat, Silas C., 987, Sterling Place, Brooklyn, N.Y., U.S.A.
 1886. Whitwell, Wm., Brookside, Darley Knowle, Warwickshire.
 1911. Williams, James M. M., Imperial House, Pontlloftyn, Cardiff.
 1889. Williams, John M., 31, Grove Park, Liverpool.
 1913. Winckworth, Ronald, 37, Upper Rock Gardens, Brighton.
 1906. Winkworth, John F., 290, Burdett Road, London, E.
 1890. Wood, Albert, Midland Lodge, Sutton Coldfield, Warwickshire.
 1910. Woodcock, R., Fauvic, Jersey.
 1901. *L* Woodruffe-Peacock, Rev. E. A., F.L.S., etc., Cadney, Brigg, Lincs.
 1911. Woods, Rev. F. H., B.D., Bainton Rectory, Driffeld.
 1898. Woods, Henry, M.A., F.G.S., 39, Barton Road, Cambridge.
 1886. *L* Woodward, Bernard B., F.L.S., etc., 4, Longfield Rd., Ealing, W.
 1903. Worsdale, R., 102, Dudley Terrace, Dudley Road, Grantham.
 1906. Wragge, Clement L., F.R.G.S., etc., Perth, Western Australia.
 1895. Wright, Charles East, Woodside, Rockingham Road, Kettering.



***Vertigo alpestris* Alder in Merionethshire.**—On October 1st, 1913, I found an example of this species beneath a stone on the top of a tree-shaded wall near Dolgelley. I was pressed for time, and found no further specimen during a few minutes search; but the single specimen is typical in regard to size, sculpture, form and the number and position of the denticles, although Mr. J. W. Taylor, who has kindly confirmed my identification, considers that it is paler in colour than specimens from the North of England. The occurrence of *V. alpestris* in Wales constitutes an interesting extension of its known range, for, as Mr. Roebuck tells me, the Society's records for this species are restricted to the area in the north of England which embraces the following Vice-Counties:—Cumberland, Westmorland-with-Lake-Lancashire, Lancashire West, York South-West, York Mid-West, and Northumberland South, and to three Vice-Counties in the north of Ireland, viz., Londonderry, Antrim, and Donegal West.—CHAS. OLDHAM (*Read before the Society*, Nov. 12th, 1913).

SOME MOLLUSCAN RADULÆ.

(Presidential Address delivered at the Annual Meeting, Oct. 11th, 1913).

BY THE REV. PROFESSOR H. M. GWATKIN, D.D., M.A.

My first duty here is to express my sense of the honour you have done me in raising to this place of dignity an amateur like myself, whose life's work has been done on other fields than those of science. Yet, such scientific work as I have been able to do has been something more than a priceless relief and rest from the arduous work officially entrusted to me. It has been a strong and subtle influence pervading and transforming those other duties in ways which few can imagine and none can understand but those who follow both lines of study with full-hearted love. If I believe, as indeed I do believe, that science cannot satisfy the deepest needs and loftiest aspirations of human nature, I believe also that all history and all theology which is unscientific in its method is essentially unsound. Truth in all its range is one and indivisible, and there is but one sound method in all search for truth—that all facts must be taken into full account, and all authority must go for nothing. There is genuine science in Butler's Analogy or Westcott's Gospel of St. John; genuine religion in the patient labours of a Herschel or a Darwin. The two lines of study are more akin than the narrower votaries of either are willing to allow.

Coming down, however, from these high themes to the little corner of science where it has been my privilege to learn something, it is but a single character found only in some of the mollusca—the radula. Before we go further, it may be well to give a general account of it, with chief, though not exclusive reference to the *Pulmonata*, with some of which we shall have to deal presently.

The radula, then, is an organ found only in the mollusca; and even among these it is wanting in the bivalves and in a few degraded genera, like *Magilus* or *Pyramidella*, though never in the *Pulmonata*. If the name radula conveys no more information than that it is a scraping organ, it has the negative merit of warning the unwary that it is not equivalent to the tongue or palate of higher animals, but something peculiar. It consists of what are called teeth, set on a transparent membrane, wanting in *Conus* and *Bela*, but never in the *Pulmonata*. Its average length is almost twice its breadth, though it is notably shorter in some of the arboreal genera, like *Amphidromus*, *Oxystyla*, *Achatinella*, and some species of *Drymaeus*, and notably longer in the carnivorous *Agnatha*, *Ancylus* and some of its allies,

the *Urocoptidæ*, and the land operculates. In the *Helicinidæ* it about equals the length of the shell, and in the *Neritidæ* exceeds it; while in the marine *Littorinidæ* it reaches three or even seven times that length, and has to be curled up like a watch-spring. The "teeth," again, are simple structures, not to be compared with the teeth of higher animals. Most of them have an organic basis of chitin, superficially hardened by mineral deposits; only in the brown teeth of the *Docoglossa* the chief constituent is silica hydrate.¹ In the *Pulmonata* they are of a beautiful silvery whiteness, standing out on a dark ground like spun glass. So white are they that the radula of a *Pupa* or a *Laoma* lying in water can easily be distinguished from a particle of dust. The chief exception (among the *Pulmonata*) is that the posterior part tends to a brownish colour in most of the *Agnatha* and also in *Circinaria*.

As a general rule there are many rows of teeth across the membrane, all pointing backward like the roughnesses on the cat's tongue, and serving a similar purpose of scraping, though the aculeate teeth of the carnivorous *Agnatha* may be used to seize their prey. In the *Pulmonata* we never find a suctorial mouth, or an aborted radula like that of *Harpa*, or such slender and delicate teeth as those of *Chenopus* or *Cerithiopsis*, which can only be used on the softest substances. I cannot name even a manifestly degraded radula like that of *Buccinopsis* or *Columbella*. The teeth are always very numerous, ranging down from the Mexican *Lysinoe ghiesbreghti*, which has nearly 40,000; *Limax maximus* has about 29,000; *Helix aspersa* 14,000; and even so small a species as *Pyramidula rupestris* can muster 5,500. But the number is commonly smaller when the teeth have unusual forms, and in *Brachypodella* it may come far below a thousand. It is worth noting that the English species of *Vitrea* fall into two very distinct sections. In *nitidula*, *pura*, etc., the radula resembles that of *Limax*, and the teeth range from 2,500 to 4,500; while in *alliaria*, *cellaria*, and their allies, where the teeth are considerably modified, the number is only about a thousand. There is a similar distinction in the foreign species of *Vitrea*.

Allowing for incomplete growth at the hinder end of the radula, the teeth are quite uniform from front to back. Every malformation runs down the whole file of teeth from back to front. This, indeed, is what we should expect, for every defect in the parent cell must be propagated the whole length of the radula. The transverse rows from side to side of the radula are symmetrical, in the sense that the two sides of the median line correspond tooth to tooth, or very nearly so;

Miss Sollas in *Quarterly Journal of Microscopical Science*, vol. 51 (Feb. 1897), pp. 115—

but they are never uniform, though they approach uniformity in an arboreal type we shall come to presently. In most cases, there is a central tooth, flanked on each side by laterals, and these, again, by marginals. The lateral teeth may be wanting, as in *Achatinella*, *Physa*, and what I shall presently call the Southern type of *Ancylus*; and the central tooth is wanting in some of the *Agnatha*. It is certainly present in some, though not always or in all. Of *Ennea*, for instance, it is not easy to be sure. Its presence does not to myself seem in this case a character of much importance. Central, laterals, and marginals commonly shade into each other, so that while the central tooth is defined by its position, we cannot always draw a clear line between laterals and marginals. Where, however, the distinction is evident, the straight row or gentle curve of the row is likely to be sharply indented, as where we pass from the laterals of *Ancylus lacustris* to its plate-like marginals. This, however, is more common in the marine genera—*Gibbula*, for example, or *Turbo*.

Whether the primitive radula consisted of uniform tricuspid teeth, is more than I can say. Direct evidence is wanting, for we have no fossil radulæ of *Pulmonata*, and I do not know that embryology has cleared the question; but to the best of my knowledge, no such radulæ now survive. The teeth are certainly tricuspid over most of the breadth of the radula in some of the *Endodontidæ*—a very ancient family—but even there they are not uniform, while other presumably ancient genera, like *Laoma*, *Amphidoxa*, and *Trachycystis*, shew no tendency at all to a uniform tricuspid arrangement. However, the central tooth is always symmetrical in the *Pulmonata* with either one cusp or three. Bicuspid centrals are found only in *Carinifex*, *Planorbis*, *Isidora*, *Physopsis*, and certain species of *Ancylus*—whereas *Choanomphalus* and *Erinna* are unicuspid, like *Limnæa*. In *Vaginula*, *Physa*, *Chilina*, and *Amphibola* the central tooth takes peculiar forms not easy to understand. The unsymmetrical centrals seem limited to a few of the *Trochidæ*. As a rule, it is of the same size as the laterals, or a trifle smaller; but it is much smaller in *Achatina* and its allies. Much larger I have observed it only in some anomalous American *Zonitidæ*, though Binney so figures it in *Amphibulima*. The laterals, on the other hand, are always unsymmetrical, except perhaps one or two inner laterals in a few of the *Endodontidæ*. As a rule, the inner cusp disappears almost at once, while the other two persist, growing shorter as we pass away from the centre, and gradually splitting up, the central cusp commonly into two denticles, the outer one into two or more, so that the outer marginals usually have several serrations, in *Planorbis* and *Limnæa* a good many.

This is what we may call the normal radula of the *Pulmonata*, for

it fairly describes a majority of the species, though there are many small variations, and a few considerable, even among the *Helices*, as in *Allognathus*. The exceptions, however, are important—the aculeate type, two arboreal types, and anomalous genera, like *Brachypodella*, *Physa*, *Gadinia*, *Amphibola*, and certain species of *Ancylus*. The aculeate type is so called from the thorn-shaped teeth resting on a base like the sole of a foot. In the *Agnatha* all the teeth are aculeate, though *Varicella* (a section of *Glandina*) has an obscure second cusp—an important discovery we owe to the keen eyes of Mr. Hugh Watson. Here is one link with the normal type; and there may be another in the variable central tooth of *Circinaria*. But the main transition is found in *Limax*, *Nanina*, *Helicarion*, and their allies, where the marginals only are aculeate. Yet, here, again, there is an exception in the delicate teeth of slugs like *Isselentia*, *Myotesta*, and *Damayantia*, with *Caldwellia* and some species of *Helicarion*. These are all Eastern, ranging from the Philippines to Mauritius.

One of the arboreal types is represented for the Old World by *Amphidromus* in Eastern Asia, by some species of *Papuina* from Papua to the New Hebrides, and by *Chloræa* in the Philippines; and in tropical America by *Oxystyla*, *Liguus*, some species of *Butimulus*, and many of *Drymæus*. It is worth notice that *Helicostyla* in the Philippines, *Bulimus* (*Strophocheilus*, *Auris*, *Plekocheilus*) and *Xenothauma* in South America do not belong here. Speaking generally, the central tooth is tricuspid, having a broad gouge-like central cusp, and two small side cusps, while in the marginals—for there are no laterals worth mention—the central cusp is as before, while the inner lateral is suppressed. It will be seen that this is an easy modification of the normal type.

The other arboreal type is quite different in character and distribution, being essentially Australasian. It comprises *Janella* and *Aneitea*, *Achatinella*, *Auriculella*, and *Tornatellina*. All these are Polynesian, except that *Tornatellina* reaches Mauritius in one direction, Juan Fernandez, and possibly South America in another. Here, again, we have angulated rows and no laterals; but the teeth are clove-shaped and very numerous—the central generally with a median denticle and two or three laterals; the marginals on a similar plan, but with the inner denticle the largest. This last is a point of strong contrast to the *Helicoid* species generally, but I suspect this is a very ancient type which must not be directly compared with the others.

On the action of the radula I cannot say much, and indeed I do not think it is yet fully understood, at least in the marine species. It must be studied in life. There is a motion from front to back, and a

licking movement of the front end ; but I doubt if this is a full account of it. I commend to your study the little *Margarita helicina*, found in England as far south as Scarborough. It is of a convenient size for observation in a zoophyte trough ; and I think we shall have made some way when we have made out the whirlpool motion of the radula. It is many years since I saw it, but I believe it gives a problem not even yet fully solved.

The value of the radula in classification is variable. For the genus it is always important, and commonly decisive ; for the species it is often decisive, sometimes useless. Thus, in the *Buccinidæ* the individual variation seems greater than the specific, and in huge genera, like *Clausilia* and *Achatinella*, the species cannot generally be distinguished by the radula. In the former, Mr. Davy Dean's researches would seem to shew that the clausium is a more distinctive character. Yet even in these, the radula is not quite useless. *Achatinella* separates at a glance from *Amastra*, and if the material could be obtained, I believe a clear distinction might be found between the American *Clausilias* and those of the Old World. But the difficulty of classification is always the same, whether we are classifying religions, or governments, or beasts—the difficulty of finding a character whose witness is never overborne by the convergent witness of other characters. Thus, there is no enormous difference of shell between *Helix* and *Natalina*, or of anatomy between *Murex* and *Ranella* ; yet the radulæ are very unlike. Conversely, we find a few curious likenesses of radula in genera which must stand very far apart, like *Omphalotropis* and *Ovula*, *Brachypodella* and what I shall presently call the Coosa group of *Ancylus*.

Upon the whole, however, the indications of the radula are more often confirmed by the rest of the anatomy than those of the shell. Thus, the huge radula of *Natalina*, with its aculeate teeth and enormous retractor muscles, implies a considerable difference of anatomy from that of *Helix* with its quadrate teeth and moderate buccal mass. *Patella* and *Acmaea* have very similar shells ; there is much more difference in the anatomy and the radula. So, too, the *Laomas* of Southern Europe and the *Tesseraria* of New Zealand used to pass as *Pupas*, and many another fraudulent pretender has been detected by the radula.

Let me give you now an illustration more in detail. For some years past I have studied the genus *Ancylus*, so far as my material permitted, in alliance with Mr. Bryant Walker, of Detroit. He has described the shell, while mine has been the more modest part of preparing the radula. So it is only of the radula that I can speak, though

I understand that the indications of the shell are in general agreement with those of the radula, though perhaps less conspicuous.

Taking, then, the genus *Ancylus*—in a wide sense—to include *Ferrissia*, *Lævapex*, *Lanx*, and even *Velletia* (but not *Latia*) and classifying by the radulæ alone, it falls into four well-marked sections, with very different radulæ and significant geographical distribution. The first or northern section is represented by *Ancylus fluviatilis* Müll. Of this I have examined eight species :—

<i>A. capuloides</i> Jan.	<i>A. abyssinicus</i> Jick.
<i>A. fluviatilis</i> Müll.	<i>A. aduncus</i> Gld.
<i>A. orbicularis</i> Clessin.	<i>A. recurvus</i> Parr.
<i>A. simplex</i> Baster.	<i>A. striatus</i> Quoy.

It is found all over Europe and beyond, as far certainly as Madeira, Oran, Damascus, and Abyssinia, and probably over Northern Asia ; but I have no evidence that it reaches India. In this the radula is long, and the lateral teeth are simple hooks in nearly straight rows, while the marginals have two cusps, the larger inside, but so short that they seem set on plates. The jaw is delicate, and segmented in plates, like that of *Punctum pygmæum*.

The second section is represented in my cabinet by *Ancylus lacustris* L. only. Its distribution is similar to the former, but more limited. It certainly reaches from Norway to Transylvania, though apparently not to Sicily or Syria, and certainly not to Africa. At first sight the radula is quite different. The arched rows of laterals with expanded bases and hooks with minute denticles remind us of the *Trochidæ* ; while the plate-like marginals recall the *Docoglossa*. Yet they all seem modifications of the broad hooks of the first section, and I see no reason to suspect any more distant affinities.

A third—what I have called the Southern section—must be extended to include the similar radulæ of *Gundlachia*, *Amphigyra*, and *Neoplanorbis*. I have examined thirty-two of these (N). They represent (N). TYPE (A).

AFRICA.—

<i>A. burnupi</i> Walker.	<i>A. mooiensis</i> Walker.
<i>A. equeefensis</i> Walker.	<i>A. ? compressus</i> Jick.
<i>A. transvaalensis</i> Craven.	<i>A. tanganyicensis</i> Sm.
<i>A. caffer</i> Krss.	

INDIA.—

<i>A. verruca</i> Bens.	<i>A. sp.</i> (Calcutta).
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TASMANIA.—

Gundl. petterdi Johnst.

HAWAII.—

A. sharpi Sykes.

NEARCTIC.—

A. caurinus Carp.*A. walkeri* Pgt.*A. fuscus* Ads.*A. eugraptus* Pils.*A. ohioensis* Walker.*A. kirklandi* Walker.*A. shineki* Pils.*A. rivularis* Say.*A. diaphanus* Hald.*Amph. alabamensis* Pils.*A. hemisphaericus* Walker.*Gundl. meekiana* Stimp.*A. parallelus* Say.*Neopl. tantillus* Pils.

NEOTROPICAL.—

A. excentricus Morel.*Gundl.* (Guatemala).*A. sp.* (Cordoba S.A.).

TYPE (B).

EAST AFRICA.—

A. crassistriatus Preston.*A. kempi* Preston.

TASMANIA.—

A. irvine Petterd.

AMERICA.—

A. klamathensis Hann.

sent Africa from Abyssinia to the Cape, India, Tasmania, Hawaii, and America from Vancouver and New England to Argentina. From these we may presume that it is also found in the East Indies, Australia, Polynesia, and Magellanica. Then its distribution is significant. The Northern section bears to the Southern the relation of the higher *Helices* (*Belogona siphonadenia*) to the lower. Mr. Taylor's map¹ may be copied almost unaltered, and he is likely to tell us that this is another illustration of Dominancy in Nature; and such, indeed, it seems to be. True, I know no evidence of the former existence of this group in Europe, and certainly none of its present survival; but the conclusion suggested by its present distribution is confirmed by the primitive character of the radula. The general pattern of the teeth is like the laterals of *A. lacustris*, but the rows are nearly straight instead of arched. The central tooth is bicuspid, as in *Planorbis*, the laterals have oblique tops and are more denticulate than those of *A. lacustris*, resembling those of the smaller species of *Planorbis*, while the marginals are not plate-like, but comb-like or feathery—again like *Planorbis*. The jaw, also, is in plates, as in the first section. This description generally covers the section; but it passes into an extreme form which we may call TYPE (B), of which I have

1 "Dominancy in Nature" (fig. 6), Trans. Yorks. Naturalists' Union.

seen four species—two from East Africa, one from Oregon, and one from Tasmania. These also have bicuspid centrals and comb-like marginals, but the laterals are set on large quadrate bases, and the oblique tops are broader and larger—in all this resembling the larger species of *Planorbis*, which also we may distinguish as TYPE (B). The jaw is of the usual type in *Limnæa*, with two accessory plates. *A. klamathensis* from Oregon belongs here, but its unicuspid central brings it still nearer to *Limnæa*. If, then, we divide *Planorbis* into two groups, the smaller species almost exactly agree with this Southern section, while the larger differ from it by having a shorter radula with the front end rounded, and by having the laterals on a broader and more solid basis. Among the smaller species I count *Pl. albus*; *Pl. contortus*, and even *Pl. marginatus*; to the larger belong *Pl. corneus* and *Pl. trivolvis*.

Merging *Segmentina* in *Planorbis* the list stands thus:—

TYPE (A) like TYPE (A) of *Ancylus*—

<i>Planorbis albus</i> (Müll.).	<i>P. limophilus</i> Westl.
<i>P. anderssoni</i> Ancey.	<i>P. lineatus</i> Walker.
<i>P. armiger</i> Say.	<i>P. montrouzieri</i> Gass.
<i>P. australicus</i> Sm.	<i>P. nautilus</i> L.
<i>P. brazieri</i> Allison.	<i>P. nitidus</i> Müll.
<i>P. carinatus</i> Müll.	<i>P. opercularis</i> Gld.
<i>P. contortus</i> L.	<i>P. parvus</i> Say.
<i>P. costulatus</i> Krauss.	<i>P. planodiscus</i> M. & P.
<i>P. crawfordi</i> M. & P.	<i>P. polaris</i> Schm.
<i>P. cultratus</i> L.	<i>P. saigonensis</i> Cr. & F.
<i>P. dilatatus</i> Gld.	<i>P. soudanicus</i> Mrts.
<i>P. exacutus</i> Say.	<i>P. spirorbis</i> Müll.
<i>P. haldemani</i> C. B. Ads.	<i>P. umbilicatus</i> Müll.
<i>P. japonicus</i> Mtg.	<i>P. vortex</i> L.
<i>P. leucochilus</i> M. & P.	<i>P. wheatleyi</i> Lea.

—Thirty species, mostly small. Distribution general.

TYPE (B), like *Limnæa*, but bicuspid centrals:—

<i>Planorbis bicarinatus</i> Say.	<i>P. exustus</i> Desh.
<i>P. binneyi</i> Tryon.	<i>P. feldii</i> Tryon.
<i>P. budouxianus</i> Bgt.	<i>P. guadeloupensis</i> Sby.
<i>P. campanulatus</i> Say.	<i>P. oregonensis</i> .
<i>P. corneus</i> L.	<i>P. peregrinus</i> Orb.
<i>P. coromandelicus</i> Beck.	<i>P. pfeifferi</i> Krss.
<i>P. decipiens</i> C. B. Ads.	<i>P. stramineus</i> Dkr.
<i>P. declivis</i> Sby.	<i>P. trivolvis</i> Say.
<i>P. dufouri</i> Graells.	

—Seventeen species, fairly universal, if the want of Australian species is accidental. They are mostly large species.

Our fourth section of *Ancylus* appears to be limited to the Coosa region of Alabama, which is also the home of the *Strepomatide*. Of this I have seen four species:—

A. elatior Walker.

A. gwatkinianus Walker.

A. filiosus Conr.

A. rhodacme Walker.

This, again, seems a development of the Southern type, and a very remarkable development. The general contour of the radula actually reminds us of *Brachypodella*, and there is a real likeness. In general the teeth are of the southern type; but the central is small and unicuspid or faintly bicuspid, the six or eight laterals very large, in angulated rows, with the angles pointing backwards—the rows on each side are straight, with the cusps rapidly vanishing. The jaw is of many plates, but they do not seem so separate as in *A. fluviatilis*. So far there is nothing very unlike things we have seen before; but now comes a great anomaly. Each lateral has a second cusp, a large oval tooth with a simple broad cutting edge; and these accessory cusps grow smaller as we pass away from the central tooth, vanishing about where the laterals pass into marginals. As in *Brachypodella*, the second cusp is not beside the chief one, but rises from the hinder end of the base.

Putting all this together, the oldest type of radula we have seen would seem to be that of the southern section of *Ancylus*—TYPE (A), and the weak species of *Planorbis*. Where it originated is best left uncertain, for it may date back long before climatic and other conditions gave Northern Europe its present dominant position. From this would diverge in distant ages the strong species of *Planorbis*. *Isidora*, and TYPE (B) of *Ancylus* differ little from these. It is remarkable that *Isidora* does not reach America, though it is found as far north as Algeria.

If *Physa* (including *Aplecta*) is derived from the same stock, it has undergone a strange development. The radula is shorter and differently shaped, the rows are angulated, the central tooth is peculiar—perhaps a modification of a primitive bicuspid—the laterals have disappeared, and the whole radula is an expanse of comb-like marginals with a basal process. The central tooth and this basal process are the chief difficulties, for I have noticed nothing like them elsewhere. The distribution also of *Physa* is anomalous. Like the higher Mammalia, it has not reached Australia and Polynesia—at least all the *Physas* I have seen from those parts have the radula of *Isidora* (including *Physopsis*). Nevertheless, there is a true *Physa* (*Physa compacta* Gld.) from the Hawaiian Islands. Either we have

overlooked *Physas* in Australia, or—what I am more inclined to think—this *Physa*, like some of the birds, may be of American origin.

Returning to *Ancylus*, the Coosa group seems no more than a local variation of the primitive type, though we know nothing of the condition under which its enormous laterals arose. We can only say that the Coosa region is a centre for this group, and the *Strepomatidae*, like the Balkans for *Clausilia*, the Hawaiian Islands for *Achatinellidae*, or Lapland for the heaths.

Velletia is also seriously modified; and the modification cannot well have been caused by its habit of clinging to plants instead of to stones, for American species of a similar habit shew no such modification. It seems, however, to have arisen in Europe, and, therefore, probably at no very remote geological period. Recent, also, perhaps is the northern group, now dominant in Europe. Direct evidence is hardly to be expected; but we may presume that it has displaced the southern type, which is now no longer represented in Europe by *Ancylus*, but only by the weaker species of *Planorbis*.

It will be seen that I have limited myself entirely to the radula. I am far from saying that it is the only character—I will not even say that it is the chief character—which has to be considered. But it is an important character, and it is work for a lifetime. I have, therefore, set down its indications to the best of my power without regard to other characters, and leave them to be discussed and amended by students of better training and greater leisure than myself.

Conchological Notes from Scarborough.—*Pyramidula rotundata* var. *alba*:

Having collected for many years without finding this rare variety of a common species, I was recently successful in discovering twenty mature specimens under a heap of stones near Scarborough. *Acanthinula aculeata*: Until last year I had only known this species as occurring in very small numbers, although in many districts. To find three or four at any time was the best success that I had known, and this I find is the usual experience of my collector friends. But on a visit to Forge Valley in 1911, I found together under a few stones over a score of mature individuals, besides others not fully grown.—W. GYNGELL (*Read before the Society*, Sept. 11th, 1912).

***Limax tenellus* in Surrey.**—On the 4th of August, 1912, my friend Mr. H. Wallis Kew, F.Z.S., found several examples crawling on wet trunks and on standing beeches, along with *Clausilia laminata*, etc., on a chalk escarpment below Netley Heath, near Gomshall. He sent them at once to me, and they were small typically-coloured examples of var. *cerea*. This is an important new record for the Census, and adds another to the ring of metropolitan counties in which this slug occurs (Essex S., Bucks., Oxfordshire and Herts.).—W. DENISON ROEBUCK.

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN & IRELAND.

424th Meeting, held at Manchester Museum, Sept. 10th, 1913.

Mr. W. Denison Roebuck in the chair.

Additions to the Library announced and thanks voted :—

“New Land Shells from the Philippine Islands,” by P. Bartsch. “Diagnoses of New Shells from the Pacific Ocean,” by W. H. Dall. “The Philippine Mollusks of the Genus *Dinysa*,” by P. Bartsch. “Some New Hawaiian Cephalopods,” by S. S. Berry. “The Giant Species of the Molluscan Genus *Lima*, obtained in Philippine and Adjacent Waters,” by P. Bartsch. “Sur la ponte et le Développement du Vignot (*Littorina littorea*),” by M. Caullery and P. Pelseener. “Deux Mollusques Parasites de Mollusques,” by P. Pelseener. “L’Hermaphroditisme chez les Lamellibranches,” by P. Pelseener. “The Variation of *Planorbis multi-formis* Brown,” by G. Hickling (*from the respective authors*). “Land and Fresh-water Mollusca [of Ilkley],” by J. W. Taylor (presented by W. Denison Roebuck); and the usual periodicals received in exchange.

Donations to the Cabinet announced and thanks voted :—

Aplecta hypnorum, Yiewsley, Middlesex, J. E. Cooper; *Planorbis corneus*, Hereford, Apr., 1913, A. E. Boycott; *Hyalinia helvetica*, Treharris, Glam., May 29, 1913, W. J. R. Firth; *Zua lubrica*, Wicken Fen, Cambs., 1913, J. E. Black; *Zua lubrica*, Speyside near Newtonmore, Easternness, 1913, J. E. Black; *Zua lubrica* var. *hyalina*, River Nith near Dumfries, 1913, J. E. Black; *Pyramidula rotundata*, Thornielee, co. Peebles, 1913, J. E. Black; *Hyalinia radiatula*, Peebles, hillside, 880 feet, 1913, J. E. Black; *Hyalinia radiatula*, shore of Loch Cuaich, near Dalwhinnie, Easternness, 1913, J. E. Black.

New Members Elected.

Mrs. E. Fordred.

H. F. D. Bartlett, F.E.S.

Candidates Proposed for Membership.

Edward N. Dalton, 62, The Avenue, Highams Park, Chingford (introduced by J. Moorcock and J. E. Cooper).

W. H. Ingrams, The School House, Shrewsbury (introduced by J. W. Jackson and L. J. Shackelford).

Bertram Pickard, Tregenna, Mansfield (introduced by W. Chas. Cattell and C. E. Wright).

Member Deceased.

William Moss.

A resolution of condolence with Mrs. Moss and family was passed, and an intimation was made that an obituary would be published as early as possible.

Papers Read.

Obituary Notice: Hugh Lamont Orr, by R. Welch.

Obituary Notice: D. D. Baldwin, by J. R. le B. Tomlin, M.A.

Obituary Notice: Rev. G. W. Taylor, D.D., by J. R. le B. Tomlin, M.A.

“Note on *Urocoptis* (*Bactrocoptis*) *rosea* Pfr.,” by G. C. Spence.

“Descriptions of Two New Species of *Marginella* from South Africa,” by J. R. le B. Tomlin, M.A.

Exhibits.

By Prof. A. E. Boycott: *Hyalinia lucida* and its eggs, from Port Madoc, Carnarvon.

By Mr. G. C. Spence : *Coelocentrum gigas* Pfr. ; *C. ischnostele* Pils. ; *C. hinkleyi* Pils. ; and rare species of the genus from Mexico and Peru. Also shells of *Urocoptis rosea* from J. R. le B. Tomlin's collection to illustrate his note.

By Mr. R. Standen : *Limax maximus* var. *maculata* Picard, beautifully preserved, showing the characteristic oblong, vivid black markings of this fine variety, from Melmerley, Cumb. ; collected July 14th, 1913, by Rev. W. Wright Mason.

By Mr. W. H. Heathcote : Juvenile forms of *Zirfza crispata* L., and *Tapes pullastra* var. *perforans* Mont. from chalk cliffs at Brighton.

By Mr. T. H. Platt : A beautiful series of *Quadrula pustulosa* Lea, from Old River, Arkadelphia, Arkansas ; *Arcidens confragosus* Say, from Indiana ; and *Arkansia wheeleri* Ortmann and B. Walker. This latter species is a new Naiad from Arkadelphia, Arkansas, and was brought to light by the Rev. H. E. Wheeler, who is a resident of Arkadelphia. A description of this splendid species was given by Dr. A. E. Ortmann and Bryant Walker in the January number of *The Nautilus* for 1912. The shell characters of this Naiad are quite distinct from any other species, the nearest approach to it being *Arcidens confragosus* Say, but even in this case the differences between the two species are decidedly marked, and the one could never be mistaken for the other. For those who would like to look further into the matter, the paper mentioned above will meet all requirements. It gives a very full description of both the soft parts and the shell characters, with some good comparisons with other genera and species, and there is also a beautiful plate illustrating both the outside and the inside of the shell. Also a fine specimen of *Coelocentrum gigas* Pfr. var. and eggs of same from Guatemala (coll. A. A. Hinkley).

By Messrs. J. Wilfrid Jackson and R. Standen : Large series of shells from the Prestatyn district, North Wales, including the following sixteen additions to the Census for V.C. 51 :—*Hyalinia radiatula*, *Helicella heripensis*, *Vallonia excentrica*, *Balea perversa*, *Succinea elegans*, *Limnaea palustris*, *Physa fontinalis*, *Aplexa hypnorum*, *Planorbis albus*, *Pl. crista*, *Pl. spirorbis*, *Ancylus fluviatilis*, *Pisidium casertanum*, *P. obtusale*, *P. milium*, *P. personatum*.

425th (Annual) Meeting, held at the Museum, Manchester, Oct. 11, 1913.

The Rev. Prof. H. M. Gwatkin, M.A., D.D., in the chair.

The following members were among those present :—Messrs. R. Standen, L. J. Shackleford, J. R. Hardy, J. Kidson Taylor, E. D. Bostock, J. R. le B. Tomlin, E. Collier, J. W. Jackson, T. H. Platt, F. Rhodes, J. H. Lumb, Greevz Fysher, W. M. Tattersall, R. J. Welch, F. Booth, F. Darnbrough, H. Allan, junr., J. W. Taylor, W. D. Roebuck, F. Taylor, J. F. Musham, J. D. Dean, G. C. Spence, B. Bryan, F. C. Bryan, C. H. Moore, C. Oldham, G. H. Taylor, E. C. Stump, A. E. Boycott, J. M. Williams, H. Brooksbank, W. H. Western, and Mrs. Gill ; Mrs. J. W. Jackson, Mrs. C. H. Moore, and Mr. Ford were present as visitors.

Appointment of Auditors.

Messrs. J. Kidson Taylor and F. Taylor were appointed Auditors.

Appointment of Scrutineers.

Messrs. J. R. Hardy and F. Booth were appointed Scrutineers.

New Members Elected.

W. H. Ingrams.

Edward N. Dalton.

Bertram Pickard.

Candidates Proposed for Membership.

F. Rhodes, 113, Heaton Road, Manningham, Bradford (introduced by Messrs. F. Booth and Alfred Hartley).

Dr. Fred Baker, Point Loma, California, U.S.A. (introduced by Messrs. J. R. le Brockton Tomlin and L. J. Shackelford).

Greevz Fysher, 78, Chapel Allerton Terrace, Leeds (introduced by Messrs. J. W. Taylor and F. Booth).

Professor G. W. Carr, University College Museum, Nottingham (introduced by Messrs. R. J. Welch and J. W. Taylor).

Reports.

The various Reports, adopted at the Council Meeting, were taken as read.

Election of Officers and Council.

The Scrutineers reported that the Officers and Council for the year 1913-14 had been unanimously elected as nominated by the Council (see p. 130).

Honorary Member.

On the motion of Mr. J. R. le Brockton Tomlin, seconded by Mr. John W. Taylor, M. Ph. Dautzenberg, of Paris, was unanimously elected an Honorary Member of the Society in place of Dr. Binney, U.S.A., deceased.

President's Address.

The Rev. Prof. H. M. Gwatkin, M.A., D.D., gave his Presidential Address on "Some Molluscan Radulae."

Prof. A. E. Boycott moved and Mr. John W. Taylor seconded "That the best thanks of the Society be given to Professor Gwatkin for his intensely interesting address." The motion was passed unanimously and with acclamation.

Votes of thanks to the Vice-Chancellor of Victoria University and the Vice-Chancellor of Leeds University and the Authorities of Manchester Museum for the use of rooms for the meetings of the Society, were moved and seconded by Messrs. Collier and Welch respectively.

These votes were passed unanimously.

Exhibits.

By Mr. Edward Collier : *Helix*, section *Cepæa* ; all the species of this section, with many named varieties, except the rare *aimophila* Bgt. and *vicaria* Westl., in illustration of his paper in *J. of Conch.*, vol. 14, p. 118. *Helicigona*, section *Arianta* ; specimens of *Arianta arbustorum* L., and nearly all the known varieties from many places on the continent, mostly from the Bülow collection ; also *Arianta athiops* Blz., from Transylvania.

A large series of *Clausilie* from China and Japan. Living specimens of *Helicogena vulgaris* Parr., and *Cepæa vindobonensis* Fér., from Odessa, South Russia ; also *Cepæa nemoralis* L., and *Candidula caperata* Mont., from near Lisbon.

By Mr. J. Wilfrid Jackson (on behalf of Dr. G. Hickling) : Series of shells and drawings, showing extraordinary variation in a single species—*Planorbis multi-formis* (Bronn) from Upper Miocene freshwater limestone, Steinheim, Würtemberg.

By Rev. L. J. Shackelford : *Voluta mamilla* Gray, taken from lobster-pots, Western Port, Australia ; and *Voluta concinna* Brod., dredged off Kii, Japan.

By Mr. J. Ray Hardy : Three drawers of the Genus *Obba*—a fine series, nearly all the known species being represented—chiefly from the Bülow collection.

By Mr. H. Beeston : A series of land shells, collected by sifting débris, from Eggerslack Wood, Grange-over-Sands, August 13th, 1913. From one pint of

siftings the following species were obtained:—*Vitrea pura*, *Euconulus fulvus*, *Punctum pygmaeum*, *Pyramidula rotundata*, *Acanthinula lamellata*, *A. aculeata*, *Vallonia costata*, *V. excentrica*, *Cochlicopa lubrica*, *Jamiania cylindracea*, *Vertigo alpestris*, *V. substriata*, *Sphyradium edentulum*, *Carychium minimum*, and *Acicula lineata*—1,030 specimens in all. Also *Succinea oblonga* from Meathop Marsh.

By Mr. H. Emmett: Series of *Helix arbustorum* from Dovedale and Trentham; *H. lapicida*, *Clausilia bidentata*, and *Balea perversa* from Beeston Tor, Staffs.; *Neritina fluviatilis*, Weston, Staffs.; *Physa heterostropha*, Colwich; *Paludestrina jenkinsi*, Meir Hay and Thurnet Valley; *Succinea putris*, Bewdley and Wall-grange; *Sphaerium rivicola*, *S. corneum*, *S. amnicum*, *S. pallidum*, and *Pupa muscorum* from Staffordshire localities.

By Mr. J. R. B. Masefield: *Physa heterostropha* from Colwich, Staffs., Aug., 1913.

By Mr. B. Bryan: *Limax maximus*, *Pyramidula rupestris*, *Helix virgata*, *H. caperata*, *Ena montana*, *E. obscura*, *Jamiania secale*, *Clausilia laminata*, *Cl. rolpheii*, from Cheltenham; *Succinea putris*, *Limnaea palustris*, *L. stagnalis*, *Bythinia tentaculata*, *Vivipara conlecta*, and *Pomatias elegans* from Norwich, 1913; *Arion hortensis*, *Agriolimax agrestis*, *Testacella scutulum*, *H. lapicida*, *Balea perversa*, *Ancylus fluviatilis*, *Limnaea pereger*, *Aplecta hypnorum*, *Paludestrina jenkinsi*, *Neritina fluviatilis*, *Dreissensia polymorpha*, *Sphaerium pallidum*, and *Vertigo anticvertigo*, Staffs.

By Mr. J. M. Williams: A number of very uncommon varieties of *Cypraea*, including green forms of *C. carneola* and its var. *rubiola*; green *C. argus* and specimens irregularly marked; *C. pantherina* var. *ventrosa*; beautiful varieties of *C. pyrum*; *C. onyx* var. *adusta*; *C. erronea* var. *compressa*; *C. caurica* var. *obscura*; *C. cervinella* with *cervus* markings; *C. stolidus* var. *crossi*; *C. cribraria* var. *exmouthensis*; remarkable forms of *C. eburnea*, *C. arabica*, *C. lurida*, *C. cylindrica*, *C. erosa*, *C. tessellata*, *C. rasmleighana*, *C. citrina*, *C. petitiiana*, *C. isabella*, *C. picta*, *C. zonata*, *C. helvola*, *C. talpa* (with *exusta* base), *C. caput-serpentis* var. "*dorso-albida*," and a fine specimen of *C. umbilicata*, dredged alive. He also showed a number of remarkable varieties of *Oliva*, many of them both rare and beautiful.

By Mr. T. H. Platt: (a), North American *Unios*—*Crenodonta perplicata* Conr., Old River, Arkadelphia, Arkansas, U.S.A.; *Quadrula metanevra* Raf., Ouachita River, Arkadelphia; *Q. lachrymosus* Lea, Ohio; *Q. kleiniana* Lea, Georgia; *Cyprogenia irrorata* Lea, Indiana; *Lampsilis fallaciosa* (Smith) Simpson, Old River, Ark.; *Obovaria castanea* Lea, Ouachita River, Ark. (b), South American *Unios*—*Prisodon obliquus* Schum. (= *avicularis* Lk.), Brazil; *P. symmatophorus* Meuschen, Brazil; *Hyria corrugata* Lk., Brazil; *H. rugosissima* Sowb., Amazon River; *Tetraplodon quadrilaterum* Orb., Brazil; *T. ambiguus* (Lam.), Sowb., Parana River, Uruguay; and twenty-five species of *Opisthostoma*, including a specimen of *O. grandispinosum* with eggs in mouth of shell.

By Mr. R. Welch: Holocene mollusca from Irish sandhill pockets and shell-zones in the older dunes, mostly from West Donegal localities, such as Rosapenna, Horn Head, Carrickfin, Mullaghderg, Narin, and Bundoran; Magilligan in Derry; and Whitepark Bay in co. Antrim. The feature of the collection was the great number of Vertigos, and *Vallonia pulchella* with *Acanthinula aculeata*, *Punctum pygmaeum*, *Sphyradium edentulum*, *Pupa muscorum*, *Acme lineata*, and other small species. A few sets were shown of freshwater species from shell-marls, and Cran-noge deposits in Down and Clare. A large amount of duplicate material, both sorted and unsorted, was presented to members present. He also exhibited some living specimens of *Patulastra flavida* Ziegler, reared from eggs deposited by speci-

mens collected by Mr. A. W. Stelfox, in hot-houses, Royal Botanic Gardens, Dublin, where this South European species is abundant.

By Mr. J. D. Dean: A series of Brazilian *Olividae*—*O. braziliiana* Lk., *O. auricularia* Lk., growth stages of each; *Olivella parvula* Mart. (? var. nov.), a deeply-coloured shell, banded chestnut and white, all collected by Mr. William Harling, at Santos. Also a series of the clausium in *Clausilia*, fifty species, including all the British species, and a large proportion of the sub-genus *Alopia*.

By Mr. Lionel E. Adams: Illustrations of "Accidental Resemblance"—Larva-cases of *Apterona crenulata*, and shell-like seeds of *Medicago orbicularis*, resembling small shells.

By Mr. W. Denison Roebuck: *Jamnia secale*, Melmerley Low Scar, 1,650 ft. altitude; new for Cumberland; the most northern locality in Britain. Also official maps of distribution, as authenticated, so far as the collection has proceeded, viz., from *Testacella maugei* to *Acanthinula lamellata*.

By Mrs. Gill: Three drawers containing a fine collection of *Calocochlea*, *Chloraea*, *Crystallopsis*, *Corasia*, and other Philippine species of land shells.

By Mr. F. Booth: *Limicolaria featheri*, *Martensia voiensis*, *Cyclostoma anceps*, *Rhachis rhodotenia*, *Streptaxis kibweziensis*, recently described species from British East Africa: a number of rare land shells from the Hawaiian Isles, New Zealand, and Japan; and a fine series of the genera *Plectotropis*, *Ganesella*, and *Hirasea*.

By Mr. G. C. Spence: Specimens of *Holospira*, *Eucalodium*, and many scarce species of *Urocoptis*; also co-types of *Schasicheila xanthica* from Mexico.

By Mr. C. H. Moore: Two drawers of *Cyclostoma* and *Cyclophorus*.

By Mr. J. H. Lumb: A long series of *Helix aspersa*, fully illustrating its life-history.

By Mr. R. Standen: Fifty species of British, Continental, and Exotic shells, with their calcareous eggs, and, in many cases, embryo and growth-stages of the species shown. Also well-preserved examples of *Testacella*, *Limax*, and *Arion*.

By Mr. J. Kidson Taylor: *Cypræa poraria* var. *vibex* Kenyon, *C. poraria* var. *kauaiensis* Melv., *C. poraria* var. *albella* Melv. & Stand., *C. helvola* var. *mascarinella* Melv., *C. helvola* var. *kauilani* Kenyon, *C. helvola* var. *timorensis* Kenyon, *C. helvola* var. (nebulous spots), *C. helvola* var. (ocellated spots), *C. flaveola* var. *labrolineata* Gask., *C. gangrenosa* var. *melanosema* Melv., *C. gangrenosa* var. *boivini* Kien.; *C. goodalli* Gray; *C. beckeri* Gask.; *C. miliaris* var. *diversa* Kenyon; *C. erosa* var. *phagedaina* Melv., *C. erosa* var. *straminea* Melv.; *C. pyriformis* var. *smithi* Sowb.; *C. gracilis* Gask.; *C. petitiiana* Crosse & Fischer; *C. zonata* Ch.; *C. nebulosa* Kien.; *C. walkerii* Gray, *C. walkerii* var. *bregeriana* Crosse; *C. reevei* Gray; *C. carneola* var. *loebbeckiana* Weink.; *C. fuscidentata* Gray; *C. onyx* (dark variety); *T. ovulata* Lamk.; *C. pulchra* Gray (dark form); *C. hungerfordi* var. *kiiensis* Roberts (n.v.); and three drawers containing a collection of small beautifully mounted species of British land and freshwater shells.

By Mr. J. R. le B. Tomlin: (a), a long series of the new British bivalve, *Pseudanodonta rothomagensis* Locard, from the River Teme, near Powick. (b), some rare species of *Tritonofusus*, including *T. ebur* Mörch, *T. sabini* Gray, *T. fusiiformis* Brod., *T. turgidulus* Jeff., *T. attenuatus* Jeff., *T. tortuosus* Sars, and *T. kroyeri* Möll. (c), a very fine collection of *Papua*, containing nearly one hundred species, and including *P. hedleyi* Smith, *P. chapmani* Cox, *P. groulti* Dautz., *P. goldiei* Braz., *P. sachalensis* Pfr., *P. macgillivrayi* Forbes, *P. pratti* Fulton, *P. kubaryi* Milff., *P. pseudolancolata* Dautz., *P. spadicea* Fulton, *P. lilium* Fulton, *P. humilis* Fulton, *P. boyeri* C. & F., *P. lacteolata* Smith, *P. cynthia* Fulton, *P. labillardieri* Smith, *P. woodlarkiana* Sowb., and *P. densestriata* Fulton.

ANNUAL REPORT.

THE Conchological Society, having been founded on Oct. 12th, 1876, the present is the Thirty-Sixth Annual Report, and the Council and Members are to be congratulated on the stability and progress of the Society.

At our last Annual Meeting the membership stood at 340, since which time the Society has lost eight members by death and one by resignation. On the other hand, nineteen new members have been elected, so that there is an increase over losses of ten, the membership being now 350. Of these, 294 members are resident in Great Britain and Ireland, and of the remaining 56 resident abroad, 21 are in the United States.

The eight members whose deaths the Society deeply deplores are Mrs. Carphin, W. G. Binney, R. Middleton, D. D. Baldwin, H. L. Orr, W. Moss, and the Revs. Thos. Cook and G. W. Taylor.

All these were members of many years standing, and their loss will be much felt by a large number with whom they corresponded and exchanged. The decease of Mr. William Moss, for twenty-two years a member of the Society and long an active member on its Council, calls for special mention, and an obituary will appear in the *Journal of Conchology*.

During the year the usual number of meetings has been held at the Museum, Manchester, and there have also been field-rambles.

The attendance has been well maintained, and an increased number of papers and notes has been read. The exhibits have been varied and interesting; the special exhibits in the genera *Lanistes* and *Marisa*, *Trochatella* and *Eutrochatella*, and a section of *Helix*, bringing together almost complete collections of the species included in these genera. The April meeting, attended by members of the Leeds Conchological Club, at the invitation of the Manchester and District members, was a distinct success, the addresses given by Messrs. R. Standen and J. E. Crowther being much appreciated.

At the last annual meeting questions relating to Local Branches of the Society were raised and referred to the Council. The Council replied that there were no special regulations and no affiliation fee was required; the only understanding was that the Branches should, as far as possible, be officered by members of the parent Society. It was suggested that a note should be put in the *Journal* urging the formation of Branches under the above ruling. This has already borne fruit in the formation of the North Staffordshire Branch, a report of which will be given this evening. The Council cordially welcomes this evidence of increasing interest in conchology, and hopes that wherever there are several members of the Society in a district they will form a Branch, and arrange for regular monthly meetings such as have been held for years in London and Leeds.

The *Journal of Conchology* has been issued quarterly, and there are signs of extending circulation. In connection with this subject, the Council would call emphatic attention to the loss and inconvenience often entailed on the Society by the neglect of members to notify changes of address. Every quarter copies are returned from the dead letter office for this cause. Especially is it desirable that members notify changes of address early in December, so that the list published on January 1st may be as accurate as possible. It is also again necessary to emphasize the rule that missing numbers of the *Journal* can only be supplied free to those who notify the loss during the current year of publication.

TREASURER'S REPORT.

Statement of Income and Expenditure

For the Year 1912.

RECEIPTS.				EXPENDITURE.			
	£	s.	d.		£	s.	d.
Cash in hand	33	12	11	Cost of <i>Journal</i> for Oct., 1911	12	16	4
Subscriptions	64	16	0	Cost of <i>Journal</i> for Jan., 1912	14	2	6
Three Life Composition Fees	9	9	0	Cost of <i>Journal</i> for Apr., 1912	13	4	5
Sale of Publications	9	16	5	Cost of <i>Journal</i> for July, 1912	13	15	3
Advertisements	2	17	6	Cost of <i>Journal</i> for Oct., 1912	13	17	8
				Taylor's Monograph, pt. xix.	0	5	3
				Reprints	3	17	8
				Stationery	5	4	0
				Cost of Book Cases...	11	2	8
				Library Expenses	2	18	6
				London Meeting Expenses...	1	0	6
				Recorder's Expenses	1	2	2
				Secretary's Expenses	8	0	11
				Treasurer's Expenses	1	7	6
				Editor's Expenses	0	14	0
				Curator's Expenses...	1	0	0
				Cash in hand	16	2	6
	£120	11	10		£120	11	10

Interim Statement of Income and Expenditure,

1913.

RECEIPTS.				EXPENDITURE.			
	£	s.	d.		£	s.	d.
Cash in hand	16	2	6	Cost of <i>Journal</i> for Jan., 1913	13	9	1 $\frac{1}{2}$
Subscriptions	33	16	0	Cost of <i>Journal</i> for Apr., 1913	13	0	5 $\frac{1}{2}$
Life Fee	3	3	0	Cost of <i>Journal</i> for July, 1913	12	9	6
Advertisements	1	2	0	Reprints	5	3	6
Sale of Publications	1	17	2	Stationery	2	4	5
				Malacological Society Sub-			
				scription	1	1	0
				Malacological Journal, six			
				parts	1	16	0
				Recorder's Expenses	1	11	6
				Secretary's Expenses	2	12	6
				Treasurer's Expenses	0	10	0
				Cash in hand	2	2	8
	£56	0	8		£56	0	8

RECORDER'S REPORT.

THE Hon. Recorder reports that he is still engaged upon the laborious task of collating the Census and the Record-Books with the object of ensuring that every entry in the census is represented by a detailed record in the books:

During the year, in spite of the dry and unfavourable character of the summer, many new records have been submitted and entered on the books.

Visits paid to the Kelvingrove Museum at Glasgow and the Royal Scottish Museum at Edinburgh have resulted in numerous records being submitted to the authenticators from the collections made by Mr. Alfred Brown, Mr. David Robertson, and Mr. Richard Rimmer. In former years the collections in the Museum at Manchester, in Essex, at Bath, Bristol, Exeter, Perth, etc., have contributed to the records, and your Recorder would be pleased if the authorities of museums whose contents have not yet been seen would lend assistance of a similar character.

There is still a considerable number of blanks in the Census to be filled up, more particularly in Ireland and Scotland, and the active assistance of conchologists is desired, particularly with regard to the slugs, which it is necessary should be seen alive.

The new records submitted are published from time to time in the *Journal of Conchology*.

The report on the division of vice-counties is in draft, and available for publication at any time the Society may deem fit.

ANNUAL REPORT OF THE LEEDS BRANCH

FOR THE YEAR ENDED 30TH SEPTEMBER, 1913.

TWELVE meetings have been held during the year, five in the field and seven indoor. The field meetings were held at Selby in April; Kirby Stephen, in connection with the visit of the Yorkshire Naturalists' Union to this district in May; Burnsall, Wharfedale, in June, this being also a Yorkshire Naturalists' Union meeting; Shadwell and Wike, near Leeds, in July; and the September meeting was the seventh annual joint ramble with the members of the Manchester centre, and though not so well attended as the past meetings, was equally successful otherwise.

Of the seven indoor meetings three were held in the Leeds University and three in the Bradford Cartwright Hall. Special exhibits of British species were displayed; and Mr. J. W. Taylor has continued his remarks on the life-history, habits, and distribution of each exhibit in turn. Mr. Taylor's contributions to the knowledge of these species have been highly appreciated, an excellent testimony to this being the high attendance at our indoor meetings. Special exhibits do not bar other exhibits, of which there have been fine displays at some of the meetings.

The seventh indoor meeting was held in the University, Manchester, last April, by invitation from members of the Manchester centre.

Two papers were given—one on the "Eggs of Mollusca," by Mr. R. Standen; and one entitled "Notes and Observations on *Sphaerium pallidum* in the Parish of Ilalifax," by Mr. J. E. Crowther.

The meetings of the Yorkshire Naturalists' Union are officially attended, and records of species kept in our minute-book.

Though we do not expect to add any new species to our present list, we are continually extending the range of species already known, the result of our rambles, and by individual effort.

The membership at the present time is twenty-four, with two corresponding members.

Mr. F. Rhodes, Bradford, is our President.

F. BOOTH, *Hon. Sec.*

ANNUAL REPORT OF THE LONDON BRANCH.

DURING the past year our Branch has held nine ordinary and six field-meetings. The evening meetings were generally well attended, and the exhibits were both numerous and interesting. Following the example of head-quarters, we had "special exhibits" of various genera. The plan worked well, and resulted in the exhibition of several excellent combined series.

A feature of the past year was the commencement of a type collection of British non-marine shells. This is in embryo as yet, although a useful beginning has been made. We shall be grateful for the gift of many northern forms, if any members have them to spare. The Hon. Secretary will gladly furnish lists of desiderata.

The field-meetings were held at Esher, Weybridge, Broxbourne, Stanwell, Oxted, and Shepperton. The attendance was small, except at the August meeting. Our best finds were *Vivipara costata* at Stanwell; *Vertigo substriata* near Oxted; and *Apleclea hydnorum* at Lower Halliford. The last-named is of interest, as it confirms an old Middlesex record.

The membership of this Branch remains practically the same as last year.

J. E. COOPER, *Hon. Sec.*

REPORT OF THE NORTH STAFFORDSHIRE BRANCH.

A MEETING was held in the North Staffordshire Field Club Library, Hanley, on the 24th July last, when there were present Rev. E. H. Nash, M.A., Messrs. J. R. B. Masefield, M.A., B. Bryan, and H. Emmett; and it was decided to form a North Staffordshire Branch of the Conchological Society of Great Britain and Ireland; and Mr. J. R. B. Masefield was unanimously elected President; and Mr. B. Bryan Hon. Sec. of the Branch. It was further decided to hold field meetings during the summer, and monthly evening meetings during the winter months.

The first field meeting took place on the 21st August last, and six members proceeded to Colwich, near Stafford, especially to work the canal and its banks. The result was most successful, no less than twenty-five species of molluscs being obtained, including two fine specimens of *Physa heterostropha*, dredged by Messrs. Masefield and Emmett. *Dreissensia polymorpha* was found in abundance on the walls of the canal, and *Paludetrina jenkinsi* turned up in several places.

B. BRYAN, *Hon. Sec.*

426th Meeting, held in the Museum, Manchester, Nov. 12, 1913.

Mr. Edward Collier in the chair.

Additions to the Library announced and thanks voted:

"Catalogue of the British Species of *Psidium* (Recent and Fossil) in the Collection of the British Museum (Natural History)," by B. B. Woodward (presented by Dr. W. M. Tattersall).

"Manual of Conchology," part 86, by H. A. Pilsbry.

"Non-Marine Mollusca from the Old Bed of the Thames at Barn Elms with *Margaritana (Pseudunio) auricularius* (Speng.)," by A. S. Kennard and B. B. Woodward.

"*Helix rufescens* Pennant," by A. S. Kennard and B. B. Woodward.

"Bibliography: Papers and Records relating to the Geology and Palæontology of North of England (Yorkshire excepted), published in 1912," by T. Sheppard (from the respective authors); and the usual periodicals received in exchange.

Appointment of Auditor.

Mr. C. H. Moore was appointed Auditor in place of Mr. J. Kidson Taylor, who had intimated his inability to accept the appointment made at the Annual Meeting.

New Members Elected.

Dr. Fred Baker.
Professor G. W. Carr.
Greevz Fysher.
Fred Rhodes.

Candidate Proposed for Membership.

A. Harman, 5, Harley Street, Scalby Road, Scarborough (introduced by J. A. Hargreaves and J. R. le Brockton Tomlin).

Resignations.

C. J. Sharp, M.R.C.S.
I. Shaer, B.A.

Papers Read.

"Observations on the Anatomy of *Helicella* "*heripensis* Mabilie," by A. E. Boycott and J. Wilfrid Jackson.

"*Limnæa pereger* Müll. from Dauphiné," by L. E. Adams.

"Conchological Notes from Portugal," by L. E. Adams.

"Reported Occurrence of *Helicigona lapicida* (L.) and *Ena montana* (Drap.) in Ireland," by L. E. Adams.

"*Helicigona lapicida* (L.) in Ireland," by E. Collier.

"Note on the Changes necessary in the 'List of British Non-Marine Mollusca' since its issue in 1904," by A. S. Kennard and B. B. Woodward.

"Obituary Notice: William Moss," by R. Standen.

"*Vertigo alpestris* Alder in Merionethshire," by Chas. Oldham.

Exhibits.

By Mr. G. C. Spence: Series of seven out of the eight known species of *Acavus*, showing many colour and band variations.

By Mr. Chas. Oldham: A very globose, dark, finely costate form of *Limnæa pereger*, from a little peaty tarn, Llyn Gwernan, near Dolgelley, North Wales; also *Vertigo alpestris* from same locality, to illustrate his note.

By Mrs. Gill: A drawer of *Helicostyla*, including *H. damahoyi* Pfr., *H. gari-baldiana* D. & S., *H. siquijorensis* Brod., and varieties of *H. cryptica* Brod.

By Mr. L. E. Adams: A number of non-marine shells from Portugal, to illustrate his note.

By Mr. E. Collier: *Ena montana* and *Helicigona lapicida* from Ireland, to illustrate his and Mr. Adams' notes on the subject.

By Mr. J. Wilfrid Jackson: Series of shells of *Helicella caperata* and *H. "heripensis,"* from Prestatyn, North Wales (to illustrate the anatomical paper by himself and Prof. A. E. Boycott); also *Helicella barbara* and *H. virgata* var. *lutescens* from Prestatyn.

***Limnæa pereger* Müll. from Dauphiné.**—I have recently received some interesting specimens of *L. pereger* from Le Lauteret, Dauphiné, collected at the altitude of 6,500 feet. Mr. J. W. Taylor, to whom I submitted them, says:—"They do not exactly correspond with any variety known to me, but still are very close to the var. *curta* of Clessin, and, except for being somewhat more obese, resemble the var. *blanneri* Shuttl., which is a native of elevated ground in Switzerland and South France."—LIONEL E. ADAMS (Read before the Society, Nov. 12th, 1913).

EDITORIAL NOTES.

MEMBERS are reminded that Subscriptions for 1914 are due on January 1st.

In the *Journal of Conchology*, xiv., p. 72, Mr. J. T. Marshall, in his "Additions to British Conchology," expresses the opinion that a record of *Terebratula cranium* Müll., from the Bay of Biscay, is incorrect. Mr. J. W. Jackson writes me that he has recently examined the specimen upon which this record was based, and finds it to be *T. vitrea* Gmel. as Mr. Marshall surmised, and labelled as such, so that it is difficult to understand how it came to be recorded in 1906 as *T. cranium*.

With reference to Mr. Collier's paper on the section *Tachea*—this name, by the way is inadmissible and yields to *Cepaea*—Canon Horsley writes that in Switzerland he always finds *H. sylvatica* higher up than *H. nemoralis* or *H. hortensis*, and that in his experience it is never abundant and does not live on grassy banks but on exposed rocks.

All records of authentic localities are valuable, and we make no apology for giving the following list of species contained in a small collection recently received from Natuna Island in the China Sea :—

Bulla ampulla L. v. *bifasciata* Mke.
Oliva erythrostoma L.
Mitra filaris L.
M. corrugata Lam.
M. ligata A. Ad.
Nassa arcularia L.
N. coronata Brug.
N. lurida Gld.
Cypræa erronea L.
C. annulus L.
Cerithium morus Lam.

C. coralium Dufr.
Vertagus obeliscus Brug.
V. vertagus L.
Potamides fluviatilis P. & M.
Natica lineata Lam.
N. chinensis Lam.
Pyramidella ventricosa Guerin.
Otopleura auris-cati Ch.
Neritina nalanensis Less.
Umbonium depressum A. Ad.
Mastra antiquata Spengler.

Nearly all these species were received in some numbers.

We learn from the *Journal de Conchyliologie* that the collection of recent shells made by the late André Bonnet—better known to many of our members as a genial and generous correspondent in Paris Basin fossils—was sold by auction on April 23rd in Paris. It did not contain many rarities. The following prices were given for single specimens :—*Latiaxis marwae* (large, but not in first-rate condition), 11fr. ; *Voluta papillosa*, 15fr. ; *Turicicola bairdi*, 16fr. ; *Rostellaria delicatula*, 4 to 6fr. each ; *Tiphobia horei*, 5fr. ; *Neothauma tanganyicense*, 6fr. ; *Hybocystis elephas*, 9fr.

Note on Urocoptis (Bactrocoptis) rosea Pfr.—The normally decollate portion of the species contained in the Section *Bactrocoptis* appears to be unknown. At any rate I am unable to trace any description of the same. This being so, I was pleased, when looking through some *Urocoptids* belonging to Mr. J. R. le B. Tomlin, to come across specimens of *U. rosea* Pfr., retaining the early whorls. The shells are 16.5 mm. in length, and have 18 whorls, cylindric for the lower half, above which they taper regularly to the slightly bulbous nepionic whorls (of about $2\frac{1}{2}$ volutions). The initial half whorl is decidedly elevated, and calls to mind that of some of the Jamaican *Brachypodellas*. The upper whorls are practically smooth at first, and gradually develop riblets until at about the 6th or 7th whorl from the

apex they are of normal size and strength. Similarly the apex is white and gradually becomes tinted. I am unable to trace any definite demarcation between the nepionic and post-nepionic whorls. In one example at the point, viz., the 9th whorl from the base, where atrophy would normally occur, the riblets suddenly become very faint and low, as if rubbed, for about one-third of a whorl. This portion is somewhat glossy and in parts whitish, owing apparently to the plug or septum shining through the shell substance (*Read before the Society*, Sept. 10th, 1913).—G. C. SPENCE.

Reported Occurrence of *Helicigona lapicida* (Linné) and *Ena montana* (Drap.) in Ireland.—Hitherto the Irish records of *Helicigona lapicida* have been looked upon with suspicion. In his "Monograph," part 19, page 415, Mr. J. W. Taylor says:—"Dr. Leach in his Synopsis, published in 1852, describes this species as not uncommon in the south of Ireland; but this is apparently quite erroneous, as the only ascertainable, though incorrect, records appear to be that by Brown in 1818, who ascribed Belfast as a locality on the authority of Dr. McDonnell, but that gentleman's specimens were English ones; and by Dr. Turton, who stated that specimens had been 'found by Mrs. Travers of Belgrove on the stone steps of her mansion at Cove,' Cork. It was included by Mr. J. E. Palmer in a list of captures in Kildare during 1884, and according to Thompson was introduced into the vicinity of Limerick in 1839." However, a few days ago Mr. E. Dukinfield Jones gave me several specimens of *H. lapicida* which he himself picked up at Carrick-a-Bric Castle, Fermoy, Co. Cork, in 1871, where, he says, the species was very common. Mr. Jones is of the opinion that Turton's record from Cove is probably correct. With the *H. lapicida* were specimens of *Ena montana*, which Mr. Jones is nearly sure were found by him with the other species at Fermoy, but after a lapse of forty-two years he will not speak positively. Moreover, he has never collected shells in England, and has not been presented with them, so that it is difficult to imagine where else they can have come from.—LIONEL E. ADAMS, B.A. (*Read before the Society*, Nov. 12th, 1913).

***Helicigona lapicida* (Linné) in Ireland.**—Since receiving the above note from Mr. L. E. Adams, I have been in communication with Mr. R. A. Phillips, of Ashburton, Cork, and he has kindly been over to Fermoy specially to see if this old record is true. He writes me that he was there on Saturday last, Nov. 8th, and was successful in finding two dead specimens and three living ones of this species. They were near the old ruins of Carrick-a-Bric Castle, under stones, associated with *Helix rufescens*, *H. hispida*, *Pupa cylindracea*, *Hyalinia cellaria*, etc. The specimens were all in a very small area, a few yards square, and he could find none elsewhere in the district. He saw no signs of the other reported species, *Ena montana*, but perhaps at a more favourable time of the year he might be more successful. Further investigation will be necessary to prove whether *H. lapicida* is native to the district or not, and he hopes to work the surrounding woods for both species during the next spring and summer.—EDWARD COLLIER (*Read before the Society*, Nov. 12th, 1913).

***Paludestrina jenkinsi* in Cambridgeshire.**—On August 4th, 1912, I found this species in a small pond on the bank of the tidal Nene at Guyhirne, where it was associated with *Bithynia tentaculata*. It does not appear to have been recorded hitherto for Cambridgeshire.—CHAS. OLDHAM (*Read before the Society*, March 12th, 1913). [NOTE.—This species in its uncarinated form was sent to Mr. Fred Taylor in June, 1909, by Mr. Hugh Watson, who had taken it at Wisbech.—W.D.R.J.]

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APRIL, 1914.

No. 6.

CLAUSILIA DUBIA Drap.¹ AT DOVER.

By J. DAVY DEAN.

(Read before the Society, December 10th, 1913).

"DRAPARNAUD separated Müller's *Clausilia perversa* into two species, giving to them the names *C. rugosa* and *C. dubia*, and Moquin-Tandon followed Draparnaud, substituting the name *nigricans* for *dubia*, assuming on the authority of Dr. Gray that it was so named by Pulteney in 1799. This is a mistake. There is no *Clausilia nigricans* in Dr. Pulteney's original work."² In the 1892 list published by this Society there appears *Clausilia perversa* (Pult.)=*rugosa* Drap. and var. *dubia* Drap. is introduced under that species. This was the name generally accepted at that time for the larger shell found so commonly in the Craven district of Yorkshire and among the Westmorland Fells, on the assumption that it was identical with the continental form. The list published in 1903 gives *bidentata* (Ström) [= *perversa* Pult. = *rugosa* Drap.]. Later on the var. *cravenensis* Taylor was instituted, thus establishing the distinction from the continental *dubia*. The general feeling to-day is that this form is entitled to full specific rank.

All three species or forms differ in the clausium, but it is my purpose in these notes only to shew the distinction between *dubia* and *cravenensis*.

In a paper read before the Society in January, 1912,³ Mr. H. Overton expresses an opinion that *dubia* and *cravenensis* are identical, and says he fails to discover any difference whatever. Thus his note recording the occurrence of *C. dubia* at Dover becomes puzzling and it was only quite recently that it occurred to me that the Dover shell might not be, after all, identical with the Craven form. I wrote to

¹ Not apparently identical with Draparnaud's figure and description.

² *British L. & F. W. Moll.*, Lovell Reeve.

³ *Journal of Conch.*, vol. 13, p. 276.

Mr. Overton who very kindly sent three examples. Two of these I have examined for the clausium.

In the clausia of these two species there is quite a marked difference as I hope my outlines will show. The Dover examples have all the characteristics of the continental *dubia*. In this the "spoon" is much more bent, narrower, stouter at the extreme end, the angle between spoon and pedicle more abrupt, and the lower contour of the spoon more deflected towards the pedicle.



C. dubia Drap. (Dover). *C. dubia* Drap. (Switzerland). *C. cravenensis* Taylor.

In cases of doubt we have in the clausium a very perfect little register of specific values. If the clausium is different, it follows that the internal armature is different also. It does not seem to matter whether the example taken be a long or short one, the uniformity is there. *C. dubia* Drap. is certainly a difficult species to determine from the shell alone but the confusion is more likely to be with *bidentata* (Ström) than with *cravenensis* Taylor.

I would ask my friends to examine carefully any particularly large "*bidentata*" from south-eastern localities before setting off for Dover.

CENSUS AUTHENTICATIONS FROM THE KELVINGROVE MUSEUM, GLASGOW.

By W. DENISON ROEBUCK, F.L.S., HON. RECORDER.

All the records here given are based upon examples sent to the official authenticators: myself for slugs only; Mr. Fred Taylor for *Paludetrinids*; and Mr. John W. Taylor for all other species.

Through the kindness of Mr. Peter McNair, who is in charge of the Natural History Collections of the Kelvingrove Museum at Glasgow, we have had the opportunity of examining the land and freshwater mollusca contained therein, most of them collected by the late Alfred Brown and the late David Robertson.

Ayrshire: From Troon there are numerous examples of *Helicella itala*, both adult and juvenile, in the Alfred Brown collection.

Cambridgeshire: A box full of shells collected by David Robertson and labelled "River Camden, Ely, 10/69," evidently intended for the River Cam, near Ely, contained specimens of *Pisidium fontinale*; also a few examples each of *Planorbis crista* and *Pisidium subtruncatum* from "Canal off the River Camden [query Cam] at Ely."

Cantire : *Pisidium milium*, a few small, Crinan, D. Robertson.

Clyde Islands and Wigtownshire : *Helix acuta* in abundance, var. *strigata* numerous, at Millport and Port Logan, in the D. Robertson collection. Millport is on Cumbrae, Clyde Islands, and Port Logan is in Wigtownshire.

Donegal East : From Bundoran three *Helicella itala*, and *Hygromia rufescens* in abundance.

Dumbartonshire : In the Alfred Brown collection is a tablet with several examples of *Acanthinula lamellata* labelled "Dumbartonshire"; an example of *Pisidium obtusale* from shallow water in Loch Lomond taken 30th August, 1906, in company with the already authenticated *P. pusillum*; and *Succinea putris* and *Succinea elegans* from Loch Lomond, mixed on one tablet, one of the latter and several of the former species.

Ebudes North : A few each of *Pisidium obtusale* and *P. pulchellum*, along with other species, Skye, August, 1879.

Glamorganshire : Among the collections made by the late David Robertson are several examples of *Pisidium supinum*, taken in the Cardiff canal, July, 1871; also a few *P. milium*, taken along with three other species of the genus in the Swan Pond, Sophia Gardens, Cardiff, in 1877; also an example of *Bythinia leachii*, a juvenile specimen of *Limnæa auricularia*, a few *Hyalinia alliaria*, and *Paludetrina stagnalis* in great abundance, all collected at Cardiff.

Isle of Man : In a box of shells collected in various places in the Isle of Man are several examples of *Pisidium fontinale* and a few of *Planorbis crista* var. *levigata*, the collector's name not being stated.

Lanarkshire : We have been enabled to fill up some blanks for this not well worked county as follows: *Planorbis albus* abundant, *Pisidium obtusale* and *Sphærium corneum*, both numerous, all collected by the late Mr. Alfred Brown in Possil Marsh; *Sphærium lacustre* numerous in a pond near Possil Marsh, collected by the late David Robertson; *Valvata piscinalis*, a few found by the same collector in a marsh between Uddingston and Fallside, on the roadside at bridge in 1882; and a collection made at Hairmyres, 28th September, 1872, by D. Robertson contained a few *Punctum pygmaeum*, several *Vertigo pygmaea*, a few *Pisidium fontinale*, a few *P. pulchellum*, and a few *P. milium*.

Main Argyll : Numerous examples of *Planorbis contortus*, a few *Pisidium obtusale* and one *Paludetrina stagnalis*, found "in a pond near shore, Lochgilp."

Monmouthshire : *Planorbis corneus* (several adults) and *Pl. carinatus* (a few small darkly encrusted examples) collected at Newport by Mr. Alfred Brown. Also a few examples of *Balea perversa* from Tintern Abbey neighbourhood.

Renfrewshire : From the Paisley canal (D. Robertson) are several *Valvata cristata* and several *Pisidium henslowianum*; and from Houston (D. Robertson) numerous *Pisidium fontinale*.

Ross West : *Helicella itala*, three specimens taken at Loch Carron.

We have previously had similar help from the Museums of Manchester, Essex, Dublin, Perth, Bath, Bristol, Edinburgh, Exeter, etc., and would be pleased to avail ourselves of the opportunities of examining such specimens as may appear to be new for the Census in collections stored in similar institutions.

OBSERVATIONS ON THE ANATOMY OF *HELICELLA* " *HERIPENSIS* Mabile,"

BY A. E. BOYCOTT AND J. WILFRID JACKSON.

(Read before the Society, November 12th, 1913).

THE specimens on which the following anatomical observations have been made were collected during September last at Prestatyn, North Wales, by Mr. R. Standen and one of the present writers (J. W. J.), and besides being a new record for Flintshire (v.c. 51), they are also the first specimens to be recorded for North Wales generally, and the locality is the most north-westerly one known for the species. The reference "*H. caperata* var. *heripensis*" in Mr. J. F. Musham's paper on the 'Land and Freshwater Mollusca of Iona' (*antea* p. 60) is a mistake, the specimen in question being a malformed juvenile *H. itala*, according to Mr. A. W. Stelfox.

The species was found to be fairly common in several places on the hedge-banks around Prestatyn, from the shore to the foot of the steep limestone hills behind the town, and was accompanied in every case by its ally, *H. caperata*. Its extreme abundance, however, was more particularly noticeable (especially after rain) in an enclosed stretch of marsh-land behind a line of old sand-dunes on the left of the road (Bastion Road) leading down from the station to the shore, and here it was associated with almost equal numbers of *H. caperata*, and a fair sprinkling of *H. virgata* var. *lutescens*. All the shells of this latter species were remarkable for their small size, while those of both the other species were fairly large.

The specimens upon which our observations have been made were all taken from this area, and almost all the shells were found on the ground, only a few occurring on the wall bounding the field.

The habitat, about 15 feet above sea-level, is only scantily covered with grass which is closely nibbled by sheep; in places the sandy soil overlying the marsh-clay is plainly visible between the grassy patches.

Neither here, nor anywhere around Prestatyn, does there appear to be any evidence of special plant associations having any influence on the distribution and welfare of this species.

In collecting we experienced no difficulty in distinguishing *caperata* and "*heripensis*," as apart from differences in shell-sculpture and ornament, the bodies, in general, of the "*heripensis*" were notably darker than the *caperata*, though a few of the latter were darker than the palest of the former and vice-versa. The pigmentation of the mantle-edge was also different: in "*heripensis*" there was an obvious, almost

continuous, band of bright brick-red pigment mixed with the usual black; in *caperata* this was reduced to one or two spots about the centre, often microscopical in size, or was absent altogether.

The "*heripensis*" shells were relatively flatter than the *caperata*, the indices $\frac{\text{diameter} \times 100}{\text{altitude}}$ being about 165 and 145 respectively.

The variation in colour and markings of the two species was not very great.

In the "*heripensis*" the majority of the specimens were of a brownish colour, sometimes quite pale, with radiating markings and more or less interrupted bands above the periphery, and several finer bands below. A few specimens, however, were of quite a unicolorous brown all over and entirely without markings except in one or two instances where there was a peripheral whitish band. This plain colour variety appears to be the one referred to by Rev. C. E. Y. Kendall as var. *lutescens*.¹

In *caperata* the only noteworthy variation was the *ornata* form which occurred very sparingly.

A number of specimens of both forms was dissected. As regards the alimentary system and the larger nerves and ganglia no difference could be made out, except that (1) the jaw in "*heripensis*" was stronger, darker and more markedly rugose, and (2) there appeared to be rather fewer transverse rows in the radula in "*heripensis*." In a series of *caperata* radulae taken from shells of from 8.4 to 9.9 mm. diam.² (mean 9.2 mm. diam., 6.3 mm. alt.) the number of transverse rows varied from 85 to 119, average 99; the parallel series of "*heripensis*" ranged from 8.1 to 11.2 mm. (mean 10.1 mm. diam., 6.2 mm. alt.) and had from 87 to 94 transverse rows, average 91. The difference is not large but becomes perhaps more significant from the fact that in both *caperata* and "*heripensis*" the number of rows tends to increase as the shell becomes larger. Hence we should have expected the "*heripensis*" to have had rather more rows than the *caperata*. The number of teeth in a transverse row varied from 47 to 55 (average 51) in *caperata* and from 51 to 61 (average 55) in "*heripensis*." The total number of teeth was therefore in both forms just about 5,000. The shape and size of the individual teeth were the same in both series, and corresponded with *Bowell's* figure³ of *caperata*. The bifidity of the endocone on the marginal teeth to which *Bowell* drew attention⁴ was, perhaps, more easily perceptible in "*heripensis*,"

¹ *Journal of Conch.*, vol. 13, 1912, p. 345.

² It has, we think, now become clear that the radula must be described with reference to the size of the shell from which it comes.

³ *Proc. Malac. Soc.*, vol. viii., (1909), p. 384.

⁴ *Ibid.*, p. 379.

but the extent to which this character is developed varies a good deal in both series; it was, however, always present in some degree.

As regards the generative system the following points were noted:

(a) the ovotestis was rather darkly pigmented in some specimens of both forms and more frequently so in "*heripensis*" than in *caperata*:

(b) the vesicula seminalis was generally quite dark, and not seldom practically black, in both forms, and the pigmentation was better developed in "*heripensis*" than in *caperata*:

(c) the albumen gland and oviduct tended to be more ample and voluminous in "*heripensis*":

(d) the mucous glands in both species were primarily four in number, and each usually divided into two terminal branches; in rare cases, however, there was no division and in others three terminal branches arose from one stalk; the total number of branches found varied from 7 to 11 and no difference between the two forms could be made out in this respect:

(e) the duct of the spermatheca was darkly pigmented in "*heripensis*," free from pigment in *caperata*:

(f) the neck of the dart sac was free from pigment in *caperata* whereas in "*heripensis*" it was diffusely pigmented with a special concentration into two small oval patches on the lower side:

(g) the darts of both forms were of the simple type and corresponded with Ashford's classical description¹; they were distinctly larger in *caperata* than in "*heripensis*," the average measurements being about $3\frac{3}{4}$ mm. as against $2\frac{1}{2}$ mm.; for *caperata* Ashford gives from $2\frac{1}{2}$ to $3\frac{1}{2}$ mm. long.

It is not very easy to appraise the value of these various points of difference. The pigmentation of the ovotestis and vesicula seminalis was inconstant, and the difference in size in the albumen gland, oviduct and dart may well be due to differences in sexual activity, though the dart is probably worth further investigation, especially as the "*heripensis*" were on the whole distinctly larger than the *caperata*. The black or grey pigmentation of the duct of the spermatheca and the neck of the dart sac were, however, more definite distinctions; in these regions the *caperata* were quite unpigmented and, though the degree varied in different specimens, in "*heripensis*" it could always be described as dark. The pigment was ascertained to occur right through the wall in each case, and was not confined, as such colourations not infrequently are, to a connective-tissue sheath on the surface.

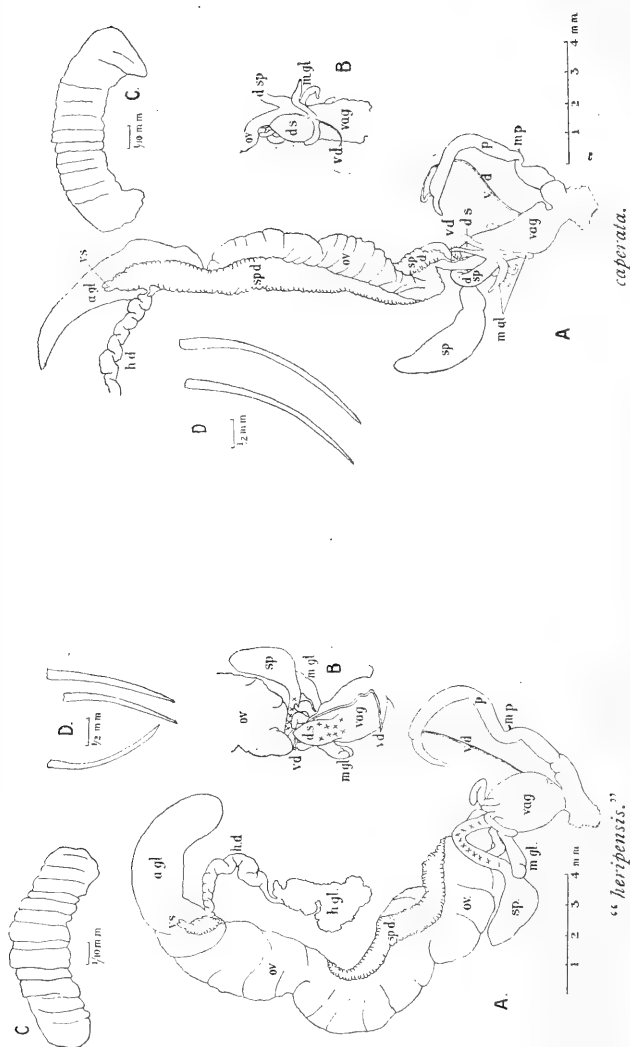
¹ *Journal of Conch.*, vol. iv. (1884), p. 131, and plate v. Ashford's figure of the genitalia in *caperata* shows 7 or 8 primary branches of the mucous gland; the arrangement was different in our specimens.

As has been already mentioned, the external surface of the body was on the whole a good deal darker in the "*heripensis*"; the internal pigmentation seemed, however, to be independent of this since the usual arrangement was found in two specimens of "*heripensis*" with pale grey bodies and in one *caperata* with a body almost black. In two specimens of *caperata* there was much more diffuse pigmentation of the inner wall of the pulmonary sac and in the connective tissue elsewhere than was present in other specimens of *caperata* or "*heripensis*"; in both of these, however, the neck of the dart sac and the duct of the spermatheca were quite free from pigment.

The significance of these differences was finally tested experimentally. A number of each form was taken by one of us, the bodies extracted and labelled A or B according as they were one or other form as judged by the shell. The bodies so labelled were then given to another person, ignorant of what shells they had come from and indeed of the question under examination, who rearranged them under distinguishing numbers. Under these numbers they were then passed on to the other of us who made a diagnosis of "*heripensis*" or *caperata* by anatomical results. Finally the conchological and anatomical diagnoses were compared and found to correspond in every case.

The conclusion which we should like to draw from this enquiry is that the anatomy of the forms known as "*heripensis*" and *caperata* is worth further investigation. The present material is particularly suitable for direct comparison because both forms were collected at the same time in the same habitat and did not differ very widely in size. But whether there are any anatomical differences which could be added to the differences in shape and sculpture of the shell to substantiate the claim that "*heripensis*" is a "good species" cannot, of course, be settled from a single instance. We would, therefore, suggest that conchologists who are in a position to obtain the necessary material should further investigate themselves the points which we have raised or should send us specimens for examination. The snails are best sent alive, soon after collection; we shall be glad to return the shells if desired.

NOTE.—It is perhaps as well to point out here that although we have used the specific name of *heripensis* Mab. for the form differing from *caperata* by reason of its finer sculpture and excentric umbilicus, it must not be inferred that we consider this to be the correct name of the species in question, as in our opinion the form agrees exactly with *H. gigaxii* (Charpentier ms.) Pfeiffer, 1850. If this identification proves to be correct the specific name *gigaxii* has priority.



EXPLANATION OF FIGURES.

The specimen of *caperata* from which the genitalia and jaws were taken had a major diameter of 9.8 mm., the specimen of "*heripensis*" 9.7 mm. The darts came from other specimens of about the same size. A.—genitalia; B.—dart sac, etc., from behind; C.—jaw; D.—darts. *h.gl.* hermaphrodite gland or ovotestis (not represented in *caperata*); *a.gl.* albumen gland; *v.s.* vesicula seminalis; *ov.* oviduct; *sp.d.* sperm duct (prostate); *v.d.* vas deferens; *p.* penis; *m.p.* retractor muscle; *d.sp.* duct of spermatheca; *m.gl.* mucous gland; *d.s.* dart sac; *vag.* vagina. The crosses indicate the pigmented areas in "*heripensis*."

OBITUARY NOTICE.

WILLIAM MOSS, F.C.A.

By R. STANDEN.

(Read before the Society, November 12th, 1913).

(With Portrait).

By the death of Mr. William Moss, which took place at his residence at Ashton-under-Lyne, after a short illness, on the 17th of June last, the Society loses a prominent and highly-respected member, who for many years had been a welcome figure at our meetings, where he will be greatly missed.

Mr. Moss was the son of the late Mr. Benjamin Moss, of Hurst, and was born on January 3rd, 1845. On leaving school he entered as pupil teacher at the Hurst British School, but as the scholastic profession did not appeal to him, he eventually commenced business in Ashton as accountant and estate agent. In course of time he took a practical part in many local concerns, and became noted as an expert in arbitration cases and Government Board enquiries. He very early became interested in natural history, and all his life kept in touch with the results of research and discovery, reading everything he could obtain bearing upon them, and not fearing to express his opinions thereon.

Mr. Moss joined this Society in 1891, and for a number of years served on the Council. He was a regular attendant at the meetings until quite recently, when failing health prevented him from venturing out in the evenings. His last appearance amongst us was on the occasion of the joint meeting of the Yorkshire and Lancashire members on Saturday, April 12th, 1913. He was one of the original members of the Malacological Society of London, and for over thirty years a member of the Manchester Microscopical Society. He contributed some valuable papers to each of these societies, and also to our own.

About forty years ago he was keenly interested in geology, and, in the congenial companionship of his friends Mr. J. H. Grundy and the late Mr. Robert Cairns, carried out exhaustive researches into the Palæontology of the numerous coal-pits around Ashton. In course of time these researches were extended into the rich Carboniferous areas of Clitheroe, Ingletton, the Isle of Man, Castleton, Derbyshire,

and other places. Later he became interested in Microscopy and recent Conchology, and although a busy man, devoted much of his spare time to these subjects. Combining the two with his skill in photography, he eventually took up as his speciality the study of the molluscan radulæ, more particularly those of the *Hyaliniæ*, a group of which he was very fond, and not only prepared them as microscopic objects in his own inimitable way, but made exquisite photomicrographs of them as well, from which he produced beautiful lantern slides. His study of this subject brought him into touch with the most expert students of the radulæ both at home and abroad. He was in continuous correspondence with the Rev. Prof. H. M. Gwatkin, the best exponent of the subject in this country, and with the Smithsonian Institution, and leading American and Japanese conchologists.

He was also keenly interested in the general anatomy of the genera in which he specialized, more particularly that of the reproductive organs. I believe he was the first to note and call attention to the curious, slipper-shaped, internal calcareous organ in *Helicella barbara* (*Bulinus acutus*), and carefully studied its functions. He did not much care for or collect marine shells. The British non-marine mollusca had first place in his regard, but he took great interest in certain groups of exotic terrestrial shells, and in the problems of insular faunas, notably those of New Zealand, Hawaii, Madeira and Trinidad. He was especially proud of a long series of *Paryphanta hochstetteri* from New Zealand, in all stages of growth from the egg upwards. Knowing my own partiality for the calcareous eggs of the mollusca he very generously handed over to me his set of eggs and embryo shells of this rare species, which, needless to say, are now amongst the most treasured specimens in my collection. As a matter of fact he was always generously disposed towards anyone working at particular groups, and ever ready to help young beginners when he had duplicates to spare. Quite recently he enriched the Museum of the Manchester Grammar School by a munificent gift of shells.

He was largely instrumental in inducing the late Mr. R. D. Darbishire to acquire the large collection of Lifu mollusca formed by his friends the Rev. James and Mrs. Hadfield. This collection, after being worked out, and the results published in our *Journal*, finally found a fitting resting place in the Manchester Museum. Of the numerous new forms described from this collection, one species, *Syrnola mossiana* Melvill and Standen, was named in his honour.

The following are the most important papers written by Mr. Moss, either singly or in collaboration with others:—

- "Notes on the Anatomy of *Trachycystis*, *Dorcasia*, and *Isomeria*," W. Moss and W. M. Webb (Proc. Mal. Soc., vol. iii., p. 263).
- "The value of the Radula as an aid to classification" (Ann. Rep. Manch. Micro. Soc., 1894, pp. 21—25, 2 pls.).
- "Reproductive Organs of *Bulimus acutus* (*Helix acuta*)" W. Moss and F. Paulden (Ann. Rep. Manch. Micro. Soc., 1892, pp. 75—79, 1 pl.).
- "Genitalia and Radulæ of the British *Hyalinia*" (Ann. Rep. Manch. Micro. Soc., 1898, pp. 24—28, 2 pls.).
- "Observations on the Radulæ of *Hyalinia draparnaldi*, *cellaria alliaria* and *glabra*," W. Moss and A. E. Boycott (*Journ. of Conch.* vol. 12, pp. 157—160).
- "A Preliminary Note on the Genitalia of *Hyalinia* (*Zonitoides*) *nitida* Müll., and *Hy. excavata* Bean" (*Journ. of Conch.*, vol. 8, p. 421).



Snail Shells as Lamps in Italy.—The following appears in "Folklore," xiv., p. 215 (1913): "On Holy Thursday at Limone the windows are illuminated by lamps consisting of wicks in snail shells full of oil. . . ."—Miss Canziani, "Piedmontese Folklore," I.—S. L. PETTY (*Read before the Society*, January 14th, 1914).

Conchological Notes from Portugal.—A month's wandering about Portugal during May and June of last year (1913) was disappointing from a conchological point of view. Considering that the country is a mass of granite hills interspersed with pine forests, bracken, gorse and heather, and that not a drop of rain fell during the whole time of my stay I was not surprised to find comparatively few species. The rivers and streams are devoid of weeds and the only living beings I could find in them were small trout which struggled for a precarious living, feeding, presumably, on the very few insects that exist along the banks. My quest was for British species in particular and the following short list may interest British collectors. I cannot help thinking that some of the sandy bays and the dykes near the sea near Coimbra and Valença, which I was unable to search, would yield a more abundant harvest. *Arion ater* L., a few typical specimens on street fountains at Bom Jesus; abundant around Mondariz (over the Spanish border), mostly of the *aterrima* form. *Limax arborum* B.-Ch., one typical specimen at Bom Jesus and one at Mondariz. *Helix pisana* Müll., common and typical at Belem, Cascães and Caldas da Rainha. *Helix aspersa* Müll., sold in Lisbon market. *Helix nemoralis* L., scarce, Belem and Cintra. *Helicella caperata* Mont., Belem and Caldas da Rainha. *H. barbara* L., Belem and Lisbon. *Pupa cylindracea* DaCosta, two specimens at Belem. *Physa acuta* Drap.? In a pond at Monserrata, Cintra.—L. E. ADAMS (*Read before the Society*, November 12th, 1913).

THE NON-MARINE MOLLUSCA OF TOURAINE.

BY F. H. SIKES, M.A., F.L.S.

(Read before the Society, February 12th, 1913).

I HAVE considerable compunction in offering a plain and almost unvarnished catalogue of the Non-marine Mollusca that I recently took in various Departments of Central France, to wit—Loiret, Loir et Cher, Indre et Loire, Indre, Eure et Loir and Eure.

For it is impossible to invest a record of this kind with much more literary interest than is possessed by Bradshaw's Guide, and were it not for the fact that five of these Departments had, according to Mr. J. W. Taylor, hitherto almost entirely escaped the notice of conchologists (which is a matter for wonder, since they include the greater part of the celebrated Châteaux) I should not think of offering my results to the *Journal*.

Possibly, however, since the district cannot long evade the collector's eagle eye and dextrous scoop, it might be well to put the numerous records in evidence, so that such small credit as may result from the work may be attached to the British Society.

The April weather (1912) did not come up to its reputation, and, as is usual in all my expeditions in search of shells, was uniformly fine, but, as I have another string to my bow in the shape of painting, I am able to bear with equanimity any dispensation of the weather bureau; still, the fineness materially affected the appearance of the land species, and I had to fall back (in one case literally) on the denizens of pond and river.

One, as I take it, *tour de force* was accomplished, and that was the finding of all the *Limnæidæ* (except, of course, *L. involuta*) together with *Amphipeplea glutinosa* in the space of ten yards, one or two members of that fraternity being, so far as my experience goes, always absent. On one side of the road, in a mill-stream near the R. Indre, were *L. stagnalis*, *L. pereger*, *L. auricularia*, and *A. glutinosa*, and in a ditch on the other side *L. palustris*, *L. truncatula* and *L. glabra* obligingly put in an appearance.

The place was Glion in the Department of Indre, and here I found 34 species.

I might add that *L. glabra* seems fairly common in France, at any rate I have found it in three very different provinces, and always in narrow ditches. In Jersey, however, it was found by me once in a large pond and once in a running stream.

Of the 63 species (exclusive of slugs which arrived home too decomposed for identification) that I took in the course of a fortnight 29 were land and 34 freshwater species.

As to the geology of the Departments worked, I append the formation, but as I naturally worked as close to the rivers as possible, the weather being so dry, not much value can be attached to it.

At Loches (Indre-et-Loire), over the Eocene formation, there is a thick stratum of yellow micaceous chalk, in which many Troglodytes have carved out their houses, as at Saumur, Poncé, etc. At Amboise this micaceous chalk is of a grey colour.

LOIRET	Dept. LOIRET	Miocene	(=L. in Catalogue).
BURY	„ LOIR ET CHER	Oligocene	(=L. et C.).
VENDÔME	„ DO.	Do.	(Do.)
AMBOISE	„ INDRE ET LOIRE	Upper Chalk	(=I. et L.).
MONTRÉSOR	„ DO.	Do.	(Do.)
LOCHES	„ DO.	Eocene	(Do.)
GLION	„ INDRE	Upper Chalk	(=I.).
BONNEVAL	„ EURE ET LOIR	Eocene	(=E. et L.).
CHARTRES	„ DO.	Do.	(Do.).
EVREUX	„ EURE	Upper Chalk	(=E.).

I have only to add that all the shells were, as usual, submitted to Mr. J. W. Taylor, who kindly confirmed or altered my conclusions.

ZONITIDÆ.

Vitrina diaphana (Drap.) Vendôme, L. et C. ; among castle ruins, Bonneval, E. et L. ; Evreux, E., in beech wood with *H. pomatia*, *H. aculeata*, etc.

Hyalinia crystallina (Müller) Glion, I., in rejectamenta of River Indre.

Hyalinia lucida (Drap.) Vendôme, L. et C. Var. *obscurata* Porro ; among castle ruins, Montrésor, I. et L. ; on castle walls, Bonneval, E. et L., Chartres, E. et L., and Evreux, E.

Hyalinia cellaria (Müller) Montrésor, I. et L., with *H. lucida*, on castle walls.

Hyalinia nitidula (Drap.) Loches, I. et L. ; Bonneval, E. et L. ; Evreux, E.

Zonitoides nitidus (Müller) Amboise, I. et L., in marshes by R. Loire ; Glion, I.

ENDODONTIDÆ.

Pyramidula rotundata (Müller) Loches, I. et L. ; var. *turtoni* Fleming, in forest of Loches.

HELICIDÆ.

- Helicella itala* (L.) Bury and Vendôme, L. et C., type and var. *minor* Locard; Amboise and Loches, I. et L., type with var. *minor* Locard.
- Candidula caperata* (Mont.) Montrésor, I. et L.; Glion, I.
- Candidula heripensis* (Mabille) Loiret, L., on white-washed wall; Montrésor, I. et L.
- Theba cartusiana* (Müller) Amboise, I. et L., on banks of R. Loire; Loches, I. et L.
- Hygromia fusca* (Mont.) Evreux, E., in beech wood two miles from town.
- Hygromia hispida* (L.) Loiret, L.; Amboise, I. et L.; Glion, I., var. *concinna* Jeff.; Chartres and Bonneval, E. et L.; Evreux, E.
- Hygromia rufescens* (DaCosta) Vendôme, L. et C., var. *minor* Locard; in castle grounds, Loches, I. et L., var. *minor*.
- Acanthinula aculeata* (Müller) Evreux, E., in beech wood, with *H. pomatia*, etc.
- Vallonia excentrica* Sterki Glion, I., by R. Indre.
- Helix aspersa* Müller This I found throughout and all were typical.
- Helix pomatia* L. Evreux, E., sub-var. *compacta* Hazay, in beech wood.
- Helix nemoralis* L. Loiret, L., 20 feet up on poplars; Bury, L. et C., Vendôme, L. et C.; Amboise, I. et L.; Loches, I. et L., var. *rubello-labiata* Cockerell, 00345, var. *albo-labiata* Von Mart., etc., etc.; Glion, I.; Chartres and Bonneval, E. et L.; Evreux, E.; also var. *violaceo-labiata* Taylor, at Puys (Seine inférieure).
- Helix hortensis* Müller Loiret, L., var. *fusco-labiata* Von Mart.; Bury and Vendôme, L. et C.; Amboise and Loches, I. et L.; Glion, I.; Bonneval and Chartres, E. et L.; Evreux, E.; also at Puys (Seine inférieure) var. *arenicola* Macgill., var. *fusco-labiata* Von Mart., var. *minor* Moq.-Tand., 122345, etc.

ENIDÆ.

Ena obscura (Müller)

Loiret, L. ; Bonneval, E. et L.

STENOGYRIDÆ.

Cochlicopa lubrica (Müller)

Glion, I., in rejectamenta of River Indre.

VERTIGINIDÆ.

Jaminia muscorum (L.)

Glion, I., in rejectamenta of River Indre.

Vertigo pygmæa (Drap.)

Glion, I., in rejectamenta of River Indre.

CLAUSILIIDÆ.

Clausilia bidentata (Ström.)

Bonneval, E. et L.

Clausilia parvula (Turton)

Montrésor and Loches, I. et L., in forest ; Chartres, E. et L., on city walls.

SUCCINEIDÆ.

Succinea putris (L.)Loiret, L. ; Amboise, I. et L., var. *sarsii* Esmark ; Loches, I. et L. ; Chartres, E. et L. ; Evreux, E.*Succinea elegans* RissoBury, L. et C. ; Amboise, I. et L., var. *charpii* Baudon ; Loches, I. et L. and *pfeifferi* Baudon ; Glion, I., var. *pfeifferi* and var. *albida* Taylor.

LIMNÆIDÆ.

Ancylus fluviatilis MüllerMontrésor, I. et L., in R. Indrois ; Bonneval, E. et L., var. *obtusa* Morelet.*Acroloxus lacustris* L.

Bonneval, E. et L., in pond by R. Loir.

Limnæa auricularia (L.)Loiret, L., var. *expansa* Colb., in R. Loiret ; Bury, L. et C., in R. Cisse ; Montrésor, I. et L. ; Chartres and Bonneval, E. et L. Glion, I., var. *tenera* Parreyss ; Evreux, E.*Limnæa pereger* (Müller)Bury, L. et C., var. *inflata* Kob. ; Loches and Amboise, I. et L. ; Montrésor, I. et L., var. *inflata* and var. *ampullacea* Rossm., in R. Indrois ; Glion, I., var. *inflata*, var. *oblonga* Jeff., and var. *ovata* Drap. ; Bonneval and Chartres, E. et L. ; Evreux, E.

- Limnæa truncatula* (Müller) Vendôme, L. et C., var. *ventricosa* Moq.-Tandon ; Loches, I. et L. ; Montrésor, I. et L., var. *turrita* Sow. ; Glion, I. ; Bonneval and Chartres, E. et L.
- Limnæa palustris* (Müller) Loiret, L. ; Bury, L. et C., aff. var. *obesa* Taylor ; Amboise, I. et L., var. *obesa* ; Loches, I. et L., var. *obesa* and var. *turricula* Held ; Glion, I., var. *obesa* ; Bonneval and Chartres, E. et L. ; Evreux, E.
- Limnæa stagnalis* (L.) Bury, L. et C. ; Amboise, I. et L., var. *fragilis* L. and type ; Loches, I. et L. ; Glion, I. ; Bonneval, E. et L. ; Evreux, E.
- Limnæa glabra* (Müller) Glion, I., var. *elongata* Jeff.
- Amphipeplea glutinosa* (Müller) Glion, I.
- Planorbis corneus* (L.) Bury, L. et C. ; Loches, I. et L. ; Amboise, I. et L., var. *bicolor* Colbeau ; Glion, I. ; Bonneval, E. et L.
- Planorbis carinatus* Müller Bury, L. et C., var. *disciformis* Jeff. ; Amboise, I. et L., var. *disciformis* ; Glion, I. ; Bonneval, E. et L., var. *disciformis* ; Evreux, E.
- Planorbis umbilicatus* Müller Loches, I. et L. ; Glion, I.
- Planorbis albus* Müller Glion, I.
- Planorbis vortex* (L.) Loiret, L. ; Bury, L. et C. ; Glion, I. ; Bonneval, I. et L. ; Evreux, E.
- Planorbis spirorbis* (L.) Amboise, I. et L. ; Loches, I. et L. ; Glion, I.
- Planorbis contortus* (L.) Bury, L. et C. ; Bonneval, E. et L.
- Segmentina nitida* (Müller) Bury, L. et C.
- PHYSIDÆ.
- Physa fontinalis* (L.) Loches, I. et L. ; Glion, I. ; Bonneval, E. et L.
- Aplecta hypnorum* (L.) Loches, I. et L. ; Glion, I., var. *major* Moq.-Tand.
- PALUDESTRINIDÆ.
- Bithynia tentaculata* (L.) Bury, L. et C. ; Loches, I. et L. ; Glion, I. ; Bonneval, E. et L. ; Evreux, E.
- Bithynia leachi* (Sheppard) Loches, I. et L.

VIVIPARIDÆ.

Vivipara contecta (Millet)

Amboise, I. et L. ; Bonneval and Chartres, E. et L.

VALVATIDÆ.

Valvata piscinalis (Müller)

Evreux E.

POMATIIDÆ.

: *Pomatias elegans* (Müller)

Bury and Vendôme, L. et C. ; Loches and Montrésor, I. et L. ; Evreux, E.

NERITIDÆ.

Neritina fluviatilis (L.)

Montrésor, I. et L. ; Glion, I. ; Bonneval, E. et L.

UNIONIDÆ.

Unio batavus Nilsson

Amboise, I. et L.

Unio asterianus Dupuy

Loches and Montrésor, I. et L. ; Glion, I.

Unio pictorum (L.)

Glion, I.

Anodonta cygnæa (L.)Bury, L. et C. ; Montrésor, I. et L., var. *arenaria* Schröter ; Chartres, E. et L.*Anodonta anatina* (L.)Loches, I. et L., var. *grateloupiana* Gassies, and var. *normandi* Dupuy ; Glion, I., var. *grateloupiana* and var. *subarealis* Fagot ; Bonneval, E. et L., var. *arelatensis* Jacquemin.

CYRENIDÆ.

Sphærium corneum (L.)Bury, L. et C. ; Loches, I. et L., type and var. *gibbosa* Gray ; Glion, I. ; Bonneval, E. et L., type and var. *flavescens* Macgill. ; Evreux, E.*Sphærium lacustre* (Müller)

Loches, I. et L.

Pisidium amnicum (Müller)Bury, L. et C., var. *intermedia* Gassies ; Evreux, E., type and var. *flavescens* Moq.-Tand.*Pisidium subtruncatum* Malm

Loches, I. et L.

Pisidium pusillum (Gmelin)

Glion, I.

Pisidium gassiesianum Dupuy

Bonneval, E. et L.

Pisidium pulchellum Jenyns

Evreux, E.

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN & IRELAND.

427th Meeting, held at the Museum, Manchester, Dec. 10th, 1913.

Mr. E. Collier in the chair.

Additions to the Library :—

The Librarian reported that the usual periodicals and exchanges had been received, and thanks were voted.

The thanks of the Society were also accorded to the Rev. Professor H. M. Gwatkin, D.D., for presenting his portrait for the Society's collection of Portraits of Past Presidents.

New Member Elected.

A. Harman, 5, Harley Street, Scalby Road, Scarborough.

Resignations.

W. G. Reynolds.

F. B. Jennings.

H. G. Gower.

Deaths.

Dr. Fitzsimons ; Dr. Plant.

Revision of the Roll of Members.

In accordance with Rule 4, the following names were reported as having been struck off the Roll :—

Messrs. Colwell, Cundall, Dalglish, Ensor, Harrington, Ward, and Walton.

Paper Read.

“*Clausilia dubia* Drap. at Dover,” by J. Davy Dean.

Exhibits.

By Professor A. E. Boycott :—*Hyalinia helvetica* (1) from Tremadoc, Carnarvon, with normally coloured shell, and animal in which there is none of the normal black pigment, the mantle edge being red—evidently the same condition as described by C. Oldham (*Journal of Conchology*, xiii., p. 312). (2) from Banstead, Surrey, with white shell and normally pigmented animal.

By Mr. J. Davy Dean : A series of *Clausilia bidentata*, *C. dubia*, *C. cravenensis*, and their clausia, to illustrate his paper.

By Mrs. Gill : Series of South African *Achatina* ; South American *Orthalicus* ; *Porphyrobaphe adamsoni* ; and *Bulimus dux*.

By Mr. Thos. Edwards : *Cyprea aurantia*, *Cy. arabica* var. *eglantina*, and var. *reticulata* ; and an interesting and very perfect sinistral, carinate *Buccinum undatum* from the Kentish coast.

By Mr. F. Taylor : *Helicigona lapicida* showing extreme variation in colour, from *albina* to very dark forms, from near Lynmouth ; *Unio margaritifera* and pearls, from River Lune ; *Helix virgata*, var. *alba*, and var. *ochroleuca*, from near Llandudno ; *Physa heterostrophia* from a mill lodge at Chadderton, Oldham, where it occurred this season in thousands, and has probably been introduced with cotton, as there is no connection with any canal or other body of water, the sole supply being derived from the Corporation main.

By Mr. G. C. Spence : Newly described *Urocoptis* (*Gongylostoma*) *cara* P. & H., from San José Rocks, S. Clara Province, Cuba ; also species of *Anoma* and *Placostylus porphyrocheilus* Dautz.

By Mr. R. Standen : *Volula africana* Rve., *V. ponsonbyi* Smith, and very fine *Eropecaffia* Fér., from South Africa, recently presented to the Manchester Museum.

It was decided to have the following Special Exhibits at future meetings :—

The <i>Candidula</i> section of <i>Helicella</i>	- -	Jan. 14, 1914.
The genus <i>Helicigona</i>	- - -	Feb. 11, 1914.
<i>Urocoptide</i>	- - - -	March 11, 1914.

428th Meeting, held at the Museum, Manchester, January 14th, 1914.

Mr. J. Cosmo Melvill in the chair.

Additions to the Library announced and thanks voted :—

"Report on the Investigation of Land Mollusca in the North of Scotland," by W. D. Roebuck and J. W. Taylor. "General Notes on Habitats and Occurrences of Land and Freshwater Mollusca in the North of Scotland," by F. Booth. "Observations on the Non-Marine Mollusca of Prestatyn, North Wales," by J. Wilfrid Jackson and R. Standen. "New Mollusks from the Bahama Islands," by P. Bartsch. "On a Brackish Water Pliocene Fauna of the Southern Coastal Plain," by W. H. Dall. "Manual of Conchology, pt. 87," by H. A. Pilsbry. "Die Unioniden des Gebietes zwischen Main und deutscher Donau in tiergeographischer und biologischer Hinsicht," by F. Haas and E. Schwarz (*from the respective authors*); and the usual periodicals received in exchange.

Resignations.

A. G. Marshall.

W. A. Green.

C. Dayton Gwyer.

Candidates Proposed for Membership.

Anthony John Arkell, Hinxhill Rectory, Ashford, Kent (introduced by F. H. Sikes and W. D. Roebuck).

Ernest Stainton, 70, Jubilee Road, Doncaster (introduced by L. J. Shackleford and John W. Taylor).

The Hermann Strebel Celebration.

It was reported that notice had been received by the Hon. Librarian of the intention of various scientific associations to celebrate the eightieth birthday of the distinguished scientist, Dr. Hermann Strebel, of Hamburg, on January 1st, 1914. On the occasion of his seventieth birthday, 1904, a letter of congratulation (in Latin), signed by the President and Secretary, was sent in the name of the Society. The very short notice on the present occasion, coupled with the fact that it arrived during the Christmas vacation, prevented the carrying out of the course adopted in 1904, but the Hon. Curator and Hon. Librarian took it upon themselves to send a congratulatory letter, signed on behalf of the Society, and received from Dr. Hermann Strebel a letter thanking the Society for their friendly wishes, as follows :

HAMBURG,

7th January, 1914.

TO THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN AND IRELAND.

Please accept my heartiest thanks for the congratulations to my eightieth birthday, presented to me by two representatives of your Council, whose friendly wishes I accept with great satisfaction.

Yours very truly,

HERMANN STREBEL.

Honorary Member.

It was also reported that a letter had been received from M. Ph. Dautzenberg, of Paris, through the President of the Society, expressing his great pleasure in having been elected an Honorary Member of the Society.

Papers Read.

"Snail Shells as Lamps in Italy," by S. Lister Petty.

"Notes on the Candidula Section of Helicella," by J. Wilfrid Jackson.

Exhibits.

By Messrs. J. C. Melvill and R. Standen: The interesting series of Falkland Island Mollusca collected by Mr. R. Vallentin and described in the *Annals and Mag. Nat. Hist.*, Jan., 1914.

By Mr. G. C. Spence: *Isocardia cor* L., *Pecten opercularis* L., and var. *lineata* daC., *Scaphander lignarius* L., *Aporrhais pes-pellicani* L. and others, dredged in the Bay of Biscay, off the Spanish coast, November, 1913.

By Mr. J. Kidson Taylor: Two beautiful specimens of *Cypræa kiiensis* Rob.

By Mr. J. C. Melvill: A fine example of *Conus natalis* Sowb. (= *natalensis* Sowb. emend.), from S. Africa. This species is textile in its markings, and has a very strong superficial resemblance therefore to one of that group, but it is in reality more allied to *C. rosaceus*, *tinianus*, etc., which would be classed as of the section *Chelyconus*. The textile pattern appears in other sections of *Conus*—in the *Marmoræi*, for instance, it is seen in *C. arachnoides*, *peplum*, etc., in the *Leptoconi* in *acuminatus* and *ammiralis* L. and also in *clytospiira* M. & St., first, indeed, described in Aug., 1899, as of the Textile group, and then transferred to *Leptoconus*.

The special exhibit of the evening was the "Candidula Section of Helicella," and a large number of species was exhibited by the Manchester Museum ("Layard" and "Crosse" collections), Messrs. J. Wilfrid Jackson, J. Davy Dean, E. Collier, J. R. le B. Tomlin, B. R. Lucas, and the Rev. Canon J. W. Horsley. Mr. J. W. Jackson read some notes on the more familiar forms of this Section, and brought forward conclusive arguments against the inclusion of *H. candidula* Studer in the British List. This species, or rather its var. *alpicola*, has recently been reported fossil at Woodston (*antea*, p. 83), but Mr. Jackson points out in his paper that this identification is incorrect.

Owing to the large number of forms in this Section it was decided to defer the discussion of the remaining species until a later meeting.

429th Meeting, held at the Museum, Manchester, Feb. 11th, 1914.

Mr. E. Collier in the chair.

Additions to the Library announced and thanks voted:—

"Notes on Mollusca collected in the North-West Falklands by Mr. Rupert Vallentin, F.L.S., with Descriptions of Six New Species," by J. C. Melvill and R. Standen. "Die Unioniden des Gebietes zwischen Main und deutscher Donau in tiergeographischer und biologischer Hinsicht," by F. Haas and E. Schwartz. "Northern and Arctic Invertebrates in the collection of the Swedish State Museum (Riksmuseum), vi. Prosobranchia, 2 Semiproboscidea," by N. H. Odhner (*presented by the respective authors*); "Guide to the Exhibition of Specimens illustrating the modification of the Structure of Animals in Relation to Flight," by W. G. Ridewood; "Catalogue of the British Species of Pisidium (recent and fossil) in the Collections of the British Museum (Natural History)," by B. B. Woodward (*presented by the Trustees of the British Museum*); and the usual periodicals received in exchange.

New Members Elected.

A. J. Arkell, Hinxhill Rectory, Ashford, Kent.

E. Stainton, 70, Jubilee Road, Doncaster.

Candidate Proposed for Membership.

Alan Gardiner, B.Sc. (Lond.), Quies, Porchester Road, Newbury (introduced by J. W. Taylor and L. J. Shackelford).

Resignation.

F. W. Fierke.

Revision of the List of Members.

In accordance with Rule 4, the following names were reported as having been struck off the Roll :—

Messrs. G. W. Brindley, C. S. Carter, H. F. Edgar, H. Fogerty, F. H. Gripper, R. C. Harrison, J. W. Milton, A. H. L. Newstead, S. Pace, C. Pannell, M. K. Saggi, T. Sheppard and J. F. Winkworth.

Papers Read.

“*Caecilioides acicula*, *Vallonia excentrica*, etc., in Denbighshire,” by J. W. Jackson, F.G.S.

“The Radula of *Hyalinia*, I.,” by Prof. A. E. Boycott.

“The Radula of *Hyalinia*, II. : Variation in the Radula of *H. helvetica*,” by Prof. A. E. Boycott.

“Notes on *Helicigona*,” by E. Collier.

Exhibits.

By Mr. R. Standen : A very beautiful specimen of *Limax flavus* var. *colubrina*, collected at Newport, Isle of Wight, December, 1913, by Mr. Frank Morey.

In the special exhibit of the evening, the genus *Helicigona*, Mr. Ed. Collier showed an extensive series, comprising most of the known species. He gave an interesting account of the chief characteristics of the various sections into which the genus is subdivided. Mrs. Gill also exhibited a number of fine examples of the genus.

Monstrosities of *Tapes pullastra* and *Macra stultorum*.—The two shells figured were found in Studland Bay, Dorset, on March 25th, 1913. The *Tapes pullastra* is remarkably narrow and is much swollen. It bears a superficial resemblance to the variety *ovala* (which also occurs in the Bay), but it is really a monstrosity as its curious form is due to the abrupt truncation of the anterior end.



Studland Bay has also yielded me some abnormal forms of *Tapes aureus*. The *Macra stultorum* mimics a *Corbula* in shape. The smaller valve is flattened, while the larger is more tumid than usual. I am unable to suggest any cause for this monstrosity.—J. E. COOPER (Read before the Society, May 21st, 1913).

ADDITIONS TO "BRITISH CONCHOLOGY."

By J. T. MARSHALL.

PART VII. (*continued from p. 128*).

Adula (Myrina) simpsoni Marsh.—In the *Journal* for October last, p. 126, under this name, I omitted to add the following additional particulars of this interesting species:—Soon after its original discovery, attached to the skull of a whale brought into the Aberdeen fish market by a trawler, some further specimens were discovered in a piece of pitch pine, which had been bored by *Xylophaga* and *Teredo*, and in the deserted tubes of which were about two dozen of these *Adula*, attached by a byssus. Several were alive, and were placed under examination. "They were quite at home in a watch-glass, and travelled by first protruding the foot, and then contracting it, so as to draw the shell along," while under the microscope "the action of the current through the tubes could be seen through the valves of the shell" (Simpson *in litt.*). A specimen sent me in spirit yielded the following results, which demonstrates that the animal is not far removed from *Modiolaria*:—Body dirty white, viscera light brown, mantle free, plain; incurrent tube formed by two flaps of the mantle; excurrent tube short, thick, and conical; foot white, tongue-shaped, with a conspicuous groove down the centre for the byssus. The habitat of these specimens in perforated wood brings it into complete harmony with the discovery of *A. argenteus* Jeff., from frigid water in the Shetland-Faroe Channel, which also occurred in perforated wood.

Soon afterwards, a few examples were found on a whale's skull trawled about 25 miles N.W. of Fair Isle, and a dozen more were trawled off the East Shetlands in 80 fathoms on the broken jaw of a whale. These latter were aged specimens, equal in length and breadth to the largest previous examples, but more than twice the girth, and darker in colour.

As bearing on the peculiar affinity of the *Adula* for whales' skulls and bones, the Faroe Islands ought to produce a rich harvest of these molluscs, seeing that there is a considerable whale fishery carried on by the Faroese, and the Faroe seas are strewn with the skulls and bones of whales, which are frequently brought to land. The Faroese whales are chiefly of the bottle-nose and Grindeval species, which are captured for the sake of the blubber, while the ribs are frequently used for the construction of walls and fences.

Galeomma turtoni Eds. Zool. Journ.—Alderney, a valve in shellsand (Marquand)!

Galeomma differs from all other bivalves in that it attaches itself to the undersides of stones with the valves open, like an open book laid page downwards, and in this position no part of the shell is visible, the animal, which resembles a small lump of opaline jelly, and highly distended with water, enveloping the whole shell with the mantle. When detached, the *Galeomma* very slowly and gradually draws the valves together, there being some difficulty in finding room within the valves.

I have taken the very young, about a line in length, during the month of May; in this stage the shells are extremely delicate, and under the lens appear like a membrane.

Their habitat under somewhat large stones, and the fragility of their shells render the latter peculiarly liable to fracture, and they are frequently found in a mended state. One specimen in my cabinet has been completely crushed, and the pieces, lying in confusion one over the other, are held together by a new shelly film formed inside. Other specimens are abnormally thickened by successive layers of shelly material, also formed on the inside of the shell.

In ordinary specimens, a more or less shallow furrow runs down the centre of each valve, a feature omitted from the published figures.

An interesting paper "On the Animal of *Galeomma*," by Dr. Philippi, will be found in Ann. Mag. N. Hist., 1839, vol. iv., p. 92, with figures.

Lepton squamosum Mont.—Milford Haven (Vaughan and Span)! This tends to confirm the record "Tenby (Lyons and Hanley)," given in "British Mollusca," as to which there had been some doubt; off Loch Ryan 25f., a single damaged valve. The only previous Scotch record—"Oban (Barlee)"—requires confirmation.

L. nitidum Turt.—Mr. William Baillie, of Brora, obtains this species habitually from the stomachs of haddocks. Dredged in Korea Straits 36f., with var. *laevis* Jeff.! The latter variety is an unpunctured form of the type, and also *L. prismaticum* of Monterosato.

var. **lineolata** Jeff.—Guernsey 20f., Scilly 40f. The longitudinal sculpture in this variety is similar to that of *L. clarkie*.

var. **pisidialis** Jeff.—With the type from haddocks (Baillie)! off Loch Ryan 25f., Mull of Cantire 26f. Figured in "Crag Mollusca," vol. iii., tab. ix., fig. 7b.

L. sykesii Chast.—Scariff, S.W. Ireland, 40f. (R.I.A. cruise).

L. sulcatulum Jeff.—Alderney (Marquand)! Benbecula Sound, in the Hebrides, from shallow water; valves only; a remarkable locality for this southern species. For many years it was known only from the Channel Islands, but I have taken it in the Scillies and at the Land's End, and it has also been recorded from the Isle of Man.

Associated with it at Benbecula were other southern species—*Diplo-donta rotundata*, *Cerithiopsis concatenata*, and on the shore *Littorina obtusata* var. *ornata*. Another interesting locality for this little bivalve is the Japanese seas.

L. clarkiae Clark.—Rathlin Island, Antrim (Chaster); Sanda Island 27f., Davar Island 26f., and Ailsa Craig 27f. (Knight)! Caldy Island, off Loch Ryan 25f., off Arran 60f., and Benbecula Sound 10f. Also Straits of Korea, 33°15' N., 129°5' E., in 10f. ('Sylvia')! The supplementary figure in "British Mollusca" is perfect.

L. obliquatum Monts.¹—S. W. Ireland, 10-40f. (R.I.A. cruise); Antrim (Chaster).

Montacuta substriata Mont.—Straits of Korea 54f. ('Sylvia')!

M. bidentata var. **elliptica** S. Wood, "Crag Moll.," vol. iii., supp. tab. x., fig. 21 (as *M. elliptica*).—Proportionally longer from the beaks to the front margin (being nearly as long as broad), larger, equally rounded on all sides except where interrupted by the beaks, which are nearer (almost overhanging) the posterior end. L. 0·125 in., b. 0·150. Scalloway (Simpson)! Guernsey, Donegal Bay, Killala Bay, Achil. Also from Adventure Bank, Mediterranean, 92f. ('Porcupine'); these latter are nearly circular in outline. The recent form of this variety is more abnormal than the Crag one, and resembles the young of *Tapes aureus* in shape. In outline it is still more like *M. ovata* Jeff., an Atlantic species. Not Brown's *Tellinmya elliptica*, which is *M. ferruginosa*.

var. **triangularis** Jeff.—Bantry Bay; Benbecula. This is possibly the *M. truncata* of Searles Wood.

M. tumidula Jeff.—Straits of Korea 40f., 32°46' N., 128°59' E.

M. ferruginosa Mont.—The umbones of this shell are frequently capped, similar to the freshwater species *Sphærium lacustre* and *Pisidium henslowianum*, mostly observable in the young.

M. ferruginosa is not truly parasitic, but attaches itself to its host for the purpose of sharing in its nutriment, though in some instances it follows in its tracks for the purpose of acting the part of scavenger.

The same conditions of habitat which I have observed in regard to this species in Torbay and elsewhere² also obtain at Salcombe in South Devon, but it seems to have escaped the observation of Colonel Montagu, to whom Salcombe was a favourite collecting-ground, and also of Canon Norman, who discovered *Lepton squamosum* on the same ground commensal with a shrimp (*Gebia stellata*), but missed the *Montacutæ*, while, on the other hand, though I have frequently

¹ *Lepton (Neolepton) obliquatum* Monts., Nuo. Riv. Conch. Med., p. 12; Irish Naturalist, July, 1897, p. 86, woodcuts.

² Habitat of *Montacuta ferruginosa*, Journ. of Conch., 1891, vol. vi., pp. 399-404.

taken the *Montacuta*, I have never met with a specimen of the *Lepton* or *Gebia*. My use of the term "byssal threads" in the paper above cited (pp. 400 and 402) did not mean byssi of the same nature as that of *Mytilus*, etc. It would, perhaps, be more correct to describe them as "glairy threads."

A remarkable specimen from the Scillies, dredged in 40f., looks at first sight like a new species. It is double the size of the type, more solid, and underneath the hinge-plate, about a line from the beaks and almost hidden from view, is a small pearl-like tooth in each valve on the anterior side. Perhaps these latter may be accidental excrescences, but outwardly the shell is more strikingly different, each valve being rayed with shallow corrugations from the beaks to the margins, somewhat after the manner of var. *nivea* G. O. Sars,¹ which he describes as "radiatum striolate."

var. **oblonga** Turt.—Very local. Off Loch Ryan 25f., Clyde 18f.

M. donacina S. Wood.—Church Bay, Antrim, two valves (Chaster).

M. dawsoni Jeff.—A dwarf and obliquely-triangular variety of *L. clarkie* was mistakenly recorded by me as *M. dawsoni* from Scilly, Torbay, Bantry Bay, and Bartra Island.² They have a close resemblance outwardly, and are, indeed, indistinguishable, but an examination of the hinge reveals the dentition of *L. clarkie*. My only reliable records for *M. dawsoni* are one valve from Killala Bay, and five from West Orkneys. It is evidently variable, because both the preceding are different in outline from the Donegal Bay form dredged by the 'Porcupine,' which again is different from the Arctic form.

M. (Decipula) ovata Jeff.—I do not consider the hinge of *Decipula* Jeff. to be "generically different" from that of *Montacuta* Turt., but that the name should be relegated, equally with *Tellimya* Brown, to synonyms of *Montacuta*.

A few small valves, which I have not seen, were said to have been dredged at Scariff in 40f., Great Skellig 48f., and off Baltimore 30f., all in the south-west of Ireland, during the Royal Irish Academy cruise of 1885.

Kellia suborbicularis Mont.—Rock-pools on the Kincardineshire coast, among the roots of zoophytes (Simpson)!

Kelliella miliaris Phil. has been dredged off the Shetlands in 111f., and between the Shetlands and Norway in 197f. (Simpson)!

¹ *Tellimya nivea* G. O. Sars, Moll. Reg. Arct. Norv., p. 71, tab. 20, figs. 2 a-c.

² *Journ. of Conch.*, 1897, vol. viii., p. 350.

Loripes lacteus L.—Mr. Robert Dawson has dredged a valve off Cruden, and Professor Macgillivray found some valves on the sands at Belhelvie, but it is essentially a southern species. Sowerby's figure represents the var. *desmarestii*.

The shell varies greatly in convexity and obliquity, and also in the angularity of the margins. Specimens from Palermo are unusually large and solid, exceeding an inch in length and breadth.

L. divaricatus L.—Specimens from the Scilly Islands agree with the Mediterranean form in size, convexity, and texture, and are markedly different from the valves occasionally washed ashore at the Land's End.

Lucina borealis L.—This shell is usually circular in outline, but occasionally it is broader than long and *vice versa*. There is also great diversity in the number of riblets, even in specimens living together. Many examples from Scilly are ribbed only on the umbonal area, the lower riblets coalescing and disappearing towards the margins. It is most abundant and attains a large size in the Salcombe Estuary—1 $\frac{3}{4}$ inches. Gwyn Jeffreys' valve from Tenby (2 inches) must have been quite exceptional, and has not been repeated, but specimens such as the one noticed by him as containing a "pearl" are not uncommon, where living in shallow water, and especially in shifting sands at the mouths of rivers, where they are liable to the intrusion of sand particles, which are then cemented over. I have a large series containing these internal excrescences or "pearls."

var. **gibba** Jeff.—Salcombe, Torbay, Tenby 12f., Gairloch 22f. Mr. Marquand's record of *L. borealis* being "common at Alderney," and Mr. Tomlin's "common at Herm,"¹ should be relegated to this variety, the type being almost unknown in the Channel Islands, though I have one specimen from Herm.

Axinus J. Sow.—Professor Dall has revived the *Thyasira* of Leach for a section of *Axinus*, and Professors Verrill and Bush that of *Leptaxinus* for another section.

A. croulinensis Jeff.—Off Skate Island 107f. (Scott)! Loch Ryan 20f., North Rona 40f.

var. **truncatus** Marsh. n. var.—Proportionally broader than the type, and inequilateral in consequence of the posterior side being truncated, while the hinge-plate on that side is reflected and leaf-like. Dredged in the Shetlands, in 85f., by Jeffreys, who did not notice the differences between this and the Hebridean and Doggerbank forms, which is obliquely oval and only half the size. The Norwegian and Faroe forms also belong to this variety, as well as those dredged by the 'Porcupine' on the Portugal coast in 1095 fathoms. The figures

¹ Marine Shells of Guernsey, etc., Trans. Guern. Soc. Nat. Sci., 1907, p. 5.

of Sars and Jeffreys will at once show the differences between the two. This variety has some resemblance to *A. incrassatus* var. *succisa* Jeff., though I consider the latter shell to be distinct from *A. incrassatus*.

A. incrassatus Jeff.—Between the Orkneys and Shetlands 145f., a single specimen; off the Shetlands 111f. and 155f., several; also some valves off the Faroes in 71-85f. (Simpson)!

A. ferruginosus Forb.—Off Loch Ryan 2of.

A. cycladius S. Wood.—Straits of Korea 41f., 32°42' N., 129°49' E. ('Sylvia')!

Gwyn Jeffreys' original figures in the "Annals" for 1858 are good as outlines, but the dentition is incorrect; the latter should be as stated in his description.¹ Each valve has one cardinal tooth and two laterals.

Scintilla? eddystonia Marsh., "Journ. Malac.", 1895, vol. iv., p. 35, fig. 1.—After much reconsideration and recomparison, I am confirmed in my opinion as to the specific distinctness of this shell from *Diplodonta rotundata*, but think it may be removed from *Scintilla* and placed in *Diplodonta* as *D. eddystonia*. I had already stated that "I have been greatly puzzled where to place this species." I am further convinced that should it prove not to be a true species, it will at any rate *not* be *D. rotundata*. To be so, one would have to assume that *D. rotundata* in its junior stage can take on two distinct forms, externally and internally, a phenomenon unknown in my experience. It is really nearest to *D. trigonula* of the same size, some specimens of which are more transverse or oblique than the type; but from that *S. eddystonia* is thinner, the beaks are not so obtuse, and the teeth and hinge-line, though similar, are not nearly so solid nor developed.

A young specimen of *D. rotundata* of the same size as *S. eddystonia* differs in being much thinner, the beaks less prominent and more equilateral, and the contour roundish instead of oblique. The dentition, though somewhat similar, differs in the cardinals not being nearly so strong and developed, except in specimens six times as large; they have a different slope, and there is a plate-like lateral on each side of the beaks, whereas in *S. eddystonia* the lateral is on the posterior side only. It is also significant that none of my specimens of *S. eddystonia* exceed a line, and they all appear adult so far as one can fairly judge. I am indebted to the Marquis di Monterosato for a graduated series of the young of *D. rotundata*, and on a comparison it is impossible to assume that the two shells can be the same species; the differences would strike the most casual observer.

Searles Wood, in his "Crag Mollusca," says that the young of *D. rotundata* of all sizes are abundant in the Crag deposits, but he does

¹ Brit. Conch., vol. ii., p. 228.

not remark on any differences in their shells from the adult, while his figure of *D. rotundata*, as also that of Forbes and Hanley, exhibit their lines of growth markedly, and at no stage do they conform to the obliquity of *S. eddystonia*.

Again, Gwyn Jeffreys' figures of his *Diodonta barleei* (*Diplodonta rotundata* juv.) agree with those of Sowerby, Forbes and Hanley, and S. Wood; they are identical with the umbonal area of adult *Diplodonta*, and are what one would readily concede to be the young of *D. rotundata*, while my figures of *S. eddystonia*, which are drawn fairly true to form, do not appear so, nor will they correspond to the umbones of *D. rotundata*.

Before describing my species, the shells were seen by Dr. Boog Watson, Mr. Edgar Smith, Canon Norman, and the Marquis di Monterosato. The Marquis considered them "allied to *Scaccia*," Canon Norman pronounced them (erroneously) *Kellia cycladia*, while the other gentlemen could not recognise the species.

Diplodonta rotundata Mont.—Borve Bay, Barra, valves from the shore (Knight)! Rum Island, near Skye, a valve; Benbecula Sound, 10f., another valve.

Cardium echinatum L.—Colour "yellowish-white" (Jeffreys), often shaded or zoned with reddish-brown of various shades, as in *C. tuberculatum*. A chalk-white variety comes from Paignton, but is scarce; outwardly they look like bleached shells, but all my specimens have contained the animal.

Sowerby's figure is depicted with the same sculpture as his *C. tuberculatum*; it should be as Jeffreys', with the reminder that such perfectly spined examples as the latter are seldom met with.

C. tuberculatum L.—Very rare in the Channel Islands. Mr. Marquand has a valve from Alderney, and also a fine perfect specimen which he was assured was purchased in the Guernsey fish market. Another valve was found by me at St. Aubin's, Jersey, and still another valve is in the Duprey collection at the Jersey Museum. Mr. Duprey cites Mr. Piquet, of Jersey, as having found *C. tuberculatum* "living with *C. echinatum* some years ago" in that island,¹ but I think this must have been an error.

The following records are doubtful and require confirmation—Ballantrae (Knight), Stornoway (Somerville), Bute (J. Smith), and Lewis (Robertson).

The Mediterranean form (var. *mediterranea* Monts.) is different from ours—very much smaller, more tumid and oblique, with narrower ribs, and minus the spines.

C. papillosum Poli.—Alderney (Marquand)! A previous record for Alderney by Mr. Marquand was an error for *C. exiguum* var. *sub-*

¹ Marine Shells of Guernsey, etc., Trans. Guern. Soc. Nat. Sci., 1901, p. 4 (sep. copy).

quadrata, but I subsequently found among his shells several valves undoubtedly belonging to this very rare species.

Not South Devon. See my note under *Donax trunculus*.

C. exiguum Gmel.—Jeffreys' figure, by an error of the artist, is inscribed *C. exiguum*.

var. **subquadrata** Jeff.—Alderney (Marquand)!

C. nodosum Turt.—Upper Loch Fyne, 30 to 70 fathoms (Scott. Fish. Board Report, 1897); Aberdeenshire, not uncommon (Dawson); off Loch Ryan 25f.

A remarkable specimen taken from a haddock in Sutherlandshire by Mr. William Baillie could easily be mistaken for *C. papillosum*. It is deeper than usual, rounder, and more globose, and the ribs are adorned with papillæ instead of plates.

var. **ovata** Jeff.—Achil Island.

C. edule L.—The inequivalve monstrosity appears to be very rare. There is one in the Natural History Museum, and I have seen another and larger one from Southend.

A *C. edule* distinguished itself in a remarkable manner during the summer of 1910 by vanquishing a sea-gull single-handed. The gull was observed in the air near the river Taw in Devon, flying in a very erratic manner as if unable to keep its equilibrium, and it finally fell to the ground. When approached it was found that its beaks were closed and firmly held by the *Cardium*, which had gradually suffocated the gull.

An equally curious episode occurred in the summer of 1911 at Craigton, near Linlithgow, where a water-hen was observed pecking at an open *Mytilus edulis* attached to a rock, when the mussel suddenly closed its shell and caught her tightly by the beak. The poor bird made a desperate struggle, but could not release herself, and was ultimately drowned by the rising tide.

In this connection it may be interesting to add that quite recently, at the Collingwood Hotel, Newcastle-on-Tyne, a plate of oysters was stored in the pantry overnight, and next morning one of the oysters was found to be holding a mouse between its valves. The "timorous beastie" had made a desperate struggle for freedom, and had dragged the oyster about a foot away from the plate, but the honours rested with *Ostrea edulis*, and the mouse was ignominiously captured.

Far different from the above examples is the action of the New Zealand "professional oyster-catcher," who deliberately thrusts its long and powerful beak into the mollusc and invites a firm grip; then, with a determined and calculated wrench, it detaches the oyster from its stronghold and takes it ashore to discuss at leisure.

C. minimum Phil.—Off Fair Isle (Simpson)!

C. norvegicum var. **rotunda** Jeff.—Poole; Milford Haven.

Isocardia cor L.—Moray Firth, from trawlers (Simpson) !

Cyprina islandica L.—Herm Island, valves (Tomlin).

Astarte sulcata var. **paucicostata** Jeff.—Aberdeenshire. This is Sowerby's fig. 19, pl. iv.

var. **scotica** Mat. and Rack.—Outwardly, this variety cannot be separated from the type; inwardly, the plain bevelled edge is the only reliable character. Occasionally most of the other varieties are combined with it.

var. **elliptica** Brown.—Jeffreys' figure represents an intermediate form; Sowerby's is right.

var. **trigona** Jeff.—Aberdeenshire.

var. **fusca** Poli.—Aberdeenshire.

A. compressa Mont.—Sowerby's figure (pl. iv., fig. 20) applies to the var. *striata*.

var. **globosa** Möll.—Off Aberdeenshire. In dealing with this variety in the 'Lightning' Report, Gwyn Jeffreys gives it the later name of var. *warehami* Hanc., and writes:—"My variety *globosa* is not Möller's species of that name, but agrees with a specimen from the collection of the late Mr. Albany Hancock, which was named by him var. *warehami*. The *A. sulcata* of Gould (fig. 45) represents this last variety."¹ But Gwyn Jeffreys does not here tell us what is Möller's species if not this. Great doubts have prevailed as to what is *A. globosa* Möll. and *A. warehami* Hanc., but I have little doubt they are synonyms, and Möller's name has the precedence of four years over Hancock's. Jeffreys at one time attributed *A. warehami* Hanc. to *A. fabula* Reeve,² which it resembles in shape and sculpture; but the latter has sharper beaks, a deeper and clean-cut lunule, is ribbed only on the umbones, and obscurely rayed longitudinally. Later on he attributed it to *A. crenata* Gray=*A. crebricostata* Forb.,³ which it resembles in its more circular outline; but the latter is a much coarser and more regularly ribbed shell. The figure of *A. compressa* var. *globosa* given by Sars, without author's name,⁴ appears to be an aged and thickened specimen of the var. *striata*. The variety *globosa* is not really more globose than the type, but it is much larger, circular instead of triangular, and the ribs disappear towards the margins. Hancock's figure of the var. *globosa* as *A. warehami*⁵ is fairly correct in outline, but is too coarsely executed. All the Arctic and British specimens I have seen of var. *globosa* are outwardly nearly black, indicating a habitat of tenacious black mud.

(To be continued).

¹ Möll. 'Lightning' and 'Porcupine,' Proc. Zool. Soc., 1881, p. 712.

² Möll. 'Valorous' Exp., Proc. Roy. Soc., vol. xxv., No. 173, p. 192.

³ Arctic Post-Tert. Foss., Ann. Mag. N. Hist., 1877, p. 234.

⁴ Möll. Reg. Arct. Norv., tab. 6, figs. 1 a, b.

⁵ Ann. Mag. N. Hist., 1846, vol. xviii., p. 336, pl. v., figs. 15, 16.

EDITORIAL NOTES.

The Nelson collections were formally presented to the University of Leeds on February 28, by Mr. J. W. Taylor, chairman of the Memorial Committee. The Leeds Conchological Club specially invited Manchester members of the Conchological Society over for the occasion, and afterwards entertained them to tea.

Messrs. Melvill and Standen¹ have recently published another paper on the Falklands Mollusca, with plate, and descriptions of six new species. When one reads of the conditions under which the marine fauna of these islands lives, it is surprising that so many species survive the struggle for existence. Most of the larger shells seem invariably to bear evidence of the severity of wind and weather.

We have received an interesting series of papers that appeared last year, by F. Booth, on Land and Freshwater Mollusca in the North of Scotland.² These notes, which are prefaced by a short report by Messrs. Roebuck and Taylor, are the results of a tour made by Mr. Booth, in 1910, to investigate the shell fauna of the vice-counties of Ross East, Ross West, Westernness, Ebudes North (Isle of Skye), Aberdeen North, Aberdeen South, and Kincardine, and show an addition of 84 to the authenticated records. Attention is called to the greater advance of most life along the coasts of Great Britain on the *east* side. Mr. Booth's articles make very interesting reading, as a very clear and concise account is given of the geographical, physical and geological features of each area explored.

An important paper³ has just appeared on the "Pleurotomidæ of New Caledonia and its dependencies," by MM. Bouge and Dautzenberg, and is of more than ordinary interest to some of us as it deals incidentally with a very fascinating item of the fauna of Lifu. This revision was especially necessary in the case of the Lifu things, as there was unintentionally considerable overlapping between the papers of Melvill and Standen in vol. 8 of this *Journal* and those of Abbé Hervier in the *Journal de Conchyliologie* about the same time. MM. Bouge and Dautzenberg have been able to clear up authoritatively the resulting synonymy, as they had before them most of the types in question—those of Melvill and Standen, thanks to the complaisance of the authorities of the Manchester Museum, while most of Hervier's types are in the official collection of the *Journal de Conchyliologie*. We are surprised that they did not unite *Glyphostoma lamproideum* Herv. with *G. cremonilla* M. & S., as there can be hardly any doubt as to the identity of these two names. A great many of these new forms from Lifu are now being turned up in Japan by Hirase's collectors. The reference which the authors could not find for the original description of *Clathurella rufonata* Angas is in P.Z.S., 1877, p. 38. The name should, however, be deleted as far as Lifu is concerned, as we are able to state, from an inspection of specimens, that it was based on examples of *Glyphostoma granosum* Dkr.

¹ Ann. and Mag. Nat. Hist., ser. 8, vol. 13, Jan., 1914, pp. 110—136.

² Scottish Nat., 1913.

³ Jour. de Conch., vol. 61, pp. 123—214.

Probably no work bearing on our Land and Freshwater Mollusca has been more urgently needed than a monograph of *Pisidium*, and this Mr. B. B. Woodward has at length given us in his "Catalogue of the British species of *Pisidium* (Recent and Fossil)," published under the auspices of the Trustees of the Brit. Mus., and illustrated with 30 admirable plates. The title 'Catalogue' is hardly adequate and one only gradually realises the immense amount of work that this volume represents, whether from the point of view of the enormous mass of material examined, the great extent of literature studied and summarised, or the amount of synonymy established. The leading, one may say cardinal, feature of Mr. Woodward's work is the comprehensive use made of hinge-characters for discriminating species. We gather that Bourguignat was the first to suggest the hinge as a basis for classification in 1854; Clessin advocated the same point twenty years later in the "Conchylien-Cabinet," but it has been left to Mr. Woodward thoroughly to inaugurate and elaborate the idea, and to revolutionise the study of the genus. Fourteen recent British species are catalogued and the fossil *P. astartoides* Sandb., while *P. parvulum* Clessin, though not yet recognised in these islands, is included on the chance of its turning up in quick-running water, in fine sand rather than mud. It is described as coming near to *P. supinum* in form, but squarish rather than triangular. The fossil distribution of each species is most adequately dealt with, as one would expect from the qualifications of the author. We offer him our heartiest congratulations on so valuable a contribution to our study.

Mr. Woodward has also recently written "The Life of the Mollusca," the object of which is "to give a succinct account of what is known concerning the life of that branch of the animal kingdom to which the Snail, the Oyster and the Cuttlefish belong." Special attention is, therefore, paid (the preface says) to their history, relationships and everyday life, with only general notes on the anatomy, classification, distribution, etc. It is copiously illustrated with plates, most of them taken from Dr. S. P. Woodward's classic "Manual of the Mollusca," and we particularly note a very useful one, reproduced from photos, illustrating the 'topography of bivalve shells.' The book is extremely interesting throughout and will be very useful for reference—the chapter on evolution being, perhaps, the best and full of suggestive points. The publishers are Messrs. Methuen & Co., and the price 6/- nett.

We welcome most cordially part 20 of Mr. J. W. Taylor's "Monograph," with plates 26 (not 16, as on cover), 33, 34 and 35, thus completing the third volume. Two plates which are still lacking are promised, together with the index, etc., with part 21. Part 20 contains a complete monograph of *Helicigona arbustorum* (L.), and appendical notes on certain of the *Zonitidae* and *Endodontidae*, and on *Helix pomatia*. The text figures are as excellent as ever, and the two coloured plates—one of *Helix nemoralis* and one of *Helicigona arbustorum*—are very beautiful specimens of work, though the mottlings of *arbustorum* are naturally much harder to reproduce than the bandings of *nemoralis*. Mr. R. Welch contributes a very effective photo of the Winyats, near Castleton, in Derbyshire, where *arbustorum* abounds.

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No. 7.

NOTES ON THE CANDIDULA SECTION OF HELICELLA.

By J. WILFRID JACKSON, F.G.S.

(Read before the Society, January 14th, 1914).

THE *Candidula* Section comprises a large number of species of small *Helicellæ* of which the most familiar to British collectors is the *Helicella caperata* (Montagu).

The sectional name *Candidula* was proposed by Kobelt in 1871 (Catalog., p. 22), but various members of the group have at different times been described under other sectional names, such as *Helicopsis*, *Striatella*, etc., while in 1892 Monterosato proposed a number of new sectional names all beginning with *Xero*—.

The type of the section is *H. candidula* Studer.

Like many of the allied sections of *Helicella*, the group contains a large number of indefinite species, mostly founded on slight individual variation, or on young examples of well-known forms.

The intricate synonymy of the group, and the dearth of data for discrimination on anatomical grounds renders it extremely difficult for the serious student to decide upon the correct name of any particular species. The species are very numerous throughout Middle Europe and the Mediterranean region, and at least two species are living in the British Isles.

In some parts of their anatomy they present features linking the members of this and other sections of *Helicella* with *Hygromia*. The chief among these is the simple form of dart and the frequent duplication of the dart sac. Pilsbry¹ points out that in the *Candidula* section it is probable that two sections will be distinguished, the division to be based on the number of dart sacs; but at present so few species have been dissected that such division is not possible.

In this paper I propose to discuss only the two British species, *H. caperata* and *H. gigaxii*, and the type species of the Section, *H. candidula*.

¹ Tryon's "Man. Conch.," ix., p. 254.

The following may be taken as a general description of shells of this group:—

“Shell rather small, depressed, narrowly umbilicated (as a rule), solid and chalky; surface striated; apex corneous or dark; whorls about $4\frac{1}{2}$ to 5, the last rather wide and rounded. Aperture round-lunate, lip simple, strengthened by a submarginal rib within” (Pilsbry, etc.).

The surface is usually encircled with one or more fuscous bands, but in some instances the bands are more or less interrupted and faint, or absent altogether, the shell being unicolorous. In others, again, the ornamentation takes the form of ‘mottlings,’ *i.e.*, blotches of different colour, more or less irregular in size and shape (*H. apicina*, *H. conspurcata*, etc.), with sometimes a tendency to run together and thus produce an almost unicolorous form, such as the var. *fulva* of *H. caperata*.

They inhabit a variety of situations, such as hedgerows, meadows, grassy banks, sides of water-courses, under stones, and on the stalks of grasses and other plants on dry sandy soils, often in close proximity to the sea. Many of the species are particularly hardy, enduring great changes of heat and cold.

The individual species, too, are subject to a certain amount of variation as regards size and number of individuals, according to the prevailing environmental and physical conditions in different localities. Thus there is a tendency for large forms and large numbers to be present where a calcareous soil is combined with abundant food-plants, while the plant-association alone, or the calcareous soil alone, does not appear to produce the same effect.

Helicella caperata (Mont.).—This was first described and figured as a British species by Montagu in 1803 (Test. Brit., p. 430, plate 11, fig. 11), but the figure of the shell is an exceedingly poor one. The description, however, is excellent, and removes any doubt as to identity.¹

On the continent this species bears various other names, such as *fasciolata* and *intersecta* of Poiret; *intersecta* Michaud; *striata* Drap. (in part), etc. Poiret's names are certainly earlier than that of Montagu, but his descriptions are much too brief and obscure for accurate discrimination. As to Draparnaud, his *striata* appears to cover several species, including *profuga* Schmidt and *candidula* Studer, as well as *caperata* Mont. Apart from this his name cannot be adopted since it had been used previously by Müller for another species of *Helix* (also of this Section).

Stelfox has adopted the name *H. intersecta* of Poiret in his Irish

¹ Since I read this paper Mr. J. W. Taylor has told me that he has seen Montagu's type and it is undoubtedly our British species.

Mollusca paper¹ and Clare Island Report,² and distinguishes two forms—one, which he calls the large western form, found in the west and north-west of Ireland, and the other, a smaller form, from the central limestone plain. This latter form he considers to be more akin to that found on the chalk downs of the south of England, and referable to Montagu's *H. caperata*. This would also appear to be the *H. striata* of Draparnaud (in part).

In a footnote on p. 24 of his Clare Island Report he admits that "the synonymy of this group of shells has been so muddled that it is now quite impossible to be certain of the identity of Poiret's species. This has led to the adoption of Montagu's name by many authorities."

Since so much confusion exists regarding Poiret's *intersecta* no useful purpose is served by adopting the name and it is preferable to adhere to *H. caperata* Mont.

The large 'western' form is not restricted to Irish localities, as it occurs with the smaller form at several places in this country.

H. caperata is widely distributed in the British Isles; it has been recorded from the Channel Isles, Isle of Man, Wales (10 vice-counties), England (52 vice-counties), Scotland (19 vice-counties), Ireland (33 vice-counties).

On the continent it is also widely diffused and ranges through France and Germany, Spain, Portugal, and Italy, to N. Africa (Algeria), mainly as *H. intersecta*. It is said to occur also in Greece and Palestine. It appears to be distinctly of western European distribution, and has not been found in North Europe.

There are some eight or nine well-known varieties in this country, of which the most familiar are *ornata* and *fulva*.

Some excellent notes on the variation of this species are given by the Rev. S. Spencer Pearce in the pages of this *Journal*.³

Its fossil distribution has been investigated in the South of England by Messrs. Kennard and Woodward, who record it from numerous Holocene and Pleistocene deposits.⁴ On the continent it has also been recorded by Locard and others as fossil at several places and horizons.

Helicella gigaxii (Charp. MS.) Pfr.—For many years this species had been looked upon, and recorded as, a variety of *H. caperata*, notwithstanding the fact that it presents such striking characters, and had been considered as a good species by reliable continental authorities.

¹ Proc. Roy. Irish Acad., vol. 29, 1911.

² Op. cit. vol. 31, 1912.

³ *Journ. of Conch.*, vi., 1889, p. 123, *et seq.*

⁴ NOTE.—There is a possibility that all these records do not apply to *H. caperata* but include also, or belong entirely to, the following species, *H. gigaxii*.

It was first described by Pfeiffer in 1850,¹ this author adopting Charpentier's manuscript name of *gigaxii*, and it is of some interest to find in the original description that British specimens are referred to, viz.:—"Commons near Highbycombe, Bucks," Cuming.

In 1853² the same author gives a further description of the species and includes a larger variety, "*β major*: diam. maj. $12\frac{1}{2}$, min. $10\frac{1}{2}$, alt. 7 mill." In this work he gives the distribution as France (Arles, Vaucluse, Grasse, Valence), and Britain (including the var. *β*).

Both the small form (diam. 8 mill. from Vaucluse, etc.), and the larger form, var. *major* Pfr. (diam. maj. $12\frac{1}{2}$ mill., from England), are excellently figured by Pfeiffer,³ and he refers to these figures in his later diagnosis of 1853. Tryon⁴ also adopted Pfeiffer's figures 23—25 as typical of the species.

Through the kindness of the Rev. Canon Horsley I have been able to see and compare a shell of *H. gigaxii* from Avignon, Vaucluse, and find it agrees in every way with the figures and descriptions referred to above. The same remark applies with equal force to some specimens labelled *H. heripensis* Mabilie from Lyons, kindly lent to me by Mr. B. R. Lucas.

With this experience I have now no hesitation in considering the large form (var. *major* Pfr.) as undoubtedly representing the shell described by Mabilie⁵ as *H. heripensis*, under which name it has been brought forward as a British species by Mr. A. W. Stelfox⁶ to whose interesting paper I would refer collectors for comparative figures and descriptions.

The most obvious characters distinguishing it from *H. caperata* are undoubtedly the beautiful fine striation and the eccentric umbilicus. The shells, too, are relatively flatter than in *H. caperata*. There is quite an appreciable difference in the character of the umbilicus among the shells of one gathering from any one locality. In some specimens the whole of the interior of the columella and a large portion of the penultimate whorl are visible; in others, whilst the penultimate whorl is amply exposed, the interior of the spire is scarcely visible owing to the pinching in, as it were, of the shell. This character does not appear to be connected with any particular form of shell, whether flat or with somewhat produced spire, as I have met with it in each kind in specimens from several localities.

Internally the two species also differ somewhat in pigmentation, a point which has recently been fully dealt with by Prof. Boycott

¹ Zeit. f. Mal., p. 85.

² Monog. Helic. Viv., iii., pp. 133-4.

³ Conch. Cab., i., 12, p. 316, pl. 128, f. 23—30.
Manual, iv., pl. 3, f. 25—27.

⁵ Bull. Soc. Zool. France, 1877, p. 304.

⁶ Proc. Malac. Soc., Lond., x., 1912, p. 39, pl. ii.

and myself, based upon specimens collected last summer at Prestatyn, N. Wales (*antea*, p. 164).

H. gigaxii appears to live under pretty much the same conditions as its congener *H. caperata*, by which it is often accompanied. As in this last species the size of the shell varies according to locality and environment, *i.e.*, whether largely calcareous or otherwise. The largest specimens I have seen are from Lewes, East Sussex, and these measure up to 15 mm. in diameter; the smallest I have in my own collection come from Southport, Lancs., and these measure 7 mm. These two extremes, however, can be linked together by intermediate forms from various localities.

The Southport specimens are from the coastal sand-dunes and are interesting from the fact that they are small in size and agree in every particular with Canon Horsley's specimen from Avignon, as well as with Pfeiffer's figures and description.

Judging from specimens in the Layard and Crosse collections (in the Manchester Museum), the following species, *H. idanica* Locard (Avignon); *H. lieuranensis* Bourg. (Avignon); *H. scrupellina* Fagot (Haute Garonne), and *H. derogata* Rossm. (Spain), are synonymous with *H. gigaxii*.

Two varieties have recently been distinguished by the Rev. C. E. Y. Kendall,¹ (1) var. *lutescens*—shell a wet sand colour without markings; (2) var. *albicans*—shell white, without markings, apex dark brown to black.

There is an interesting remark in Montagu's "Testacea Britannica" (p. 432), which may possibly have some reference to this species. Under his description of *H. caperata* Montagu refers to a variety from Kent "of a light cinereous colour, with so little appearance of bands or fasciæ that it might readily have been mistaken for a distinct species, was it not for the strong, regular striæ, which, amongst the British *Helices*, seems to be confined to this [*i.e. caperata*] and the *radiata* [= *rotundata* Müll.]. Mr. Boys favoured us with this shell, by the name of *Apex-niger*, by which it was known to Dr. Solander, and placed as such in the Portland cabinet."

As to whether the above variety refers to *H. gigaxii* or not can only be decided by an examination of the specimens.

It is not without interest to note that *H. gigaxii* frequently presents a unicolorous creamy or brownish shell, without a trace of any markings, though the apex is conspicuously of a dark fulvous colour.

Two very early figures of what appears to me to be *H. gigaxii* are given by Captain Thomas Brown in his 1827 work on British Shells.²

¹ *Journ. of Conch.*, vol. 13, 1912, p. 345.

² *Illus. Conch. Gt. Brit. and Ireland*, Lond., 1827, pl. 40, f. 37 and 39.

The umbilical view (f. 37) certainly suggests this species rather than *H. caperata*.

In the British Isles the known range of this species is Kent, Sussex, Hampshire, Surrey, Middlesex, Gloucester, Bucks., Herts., Suffolk, Cambridge, Hunts., Northants, Leicester, Lincoln, Yorks., Pembroke (Stelfox's list). To these can now be added Worcester (G. S. Tye, in R.D.D. Coll.); Lancashire (R.S. Coll.); Cheshire (C. O., in Conch. Soc. Coll.); Flintshire (J.W.J. Coll.); and North Berwick, Haddingtonshire (J. McMurtrie in Conch. Soc. Coll.).

From this list it will be noticed that its known distribution at present is more particularly south-eastern England with a few outlying counties further north and west which may ultimately be linked up with the more southern ones.

Helicella candidula (Studer) (non Michaud).—This species, known to many collectors under the name of *H. unifasciata* Poiret, is widely diffused on the continent, ranging through Germany, France, Switzerland, Italy, Spanish Peninsula, etc.; it is unknown, however, in the north of Europe; whilst in N. Africa it is said to be replaced by *H. reboudiana* Bourg.

It is a somewhat depressed shell, small in size, and minutely striated; umbilicus narrow; whorls $4\frac{1}{2}$ –5, slightly convex, suture deep; aperture roundish-lunate, strongly labiate within. Size: diam. 7–10; alt. 5–7 mm. The shell is whitish, sometimes unicolorous, and at times variously banded with one or more brown bands, which may be continuous or interrupted.

A good deal of interest is attached to this species owing to its having been recently reported fossil in this country by the Rev. C. E. Y. Kendall, in his paper on the Pleistocene Mollusca found at Woodston, North Huntingdonshire.¹

In working through the large amount of material met with in this interesting deposit, Mr. Kendall found a number of a small *Helicella*, previously noticed in Britain (Barnwell and Crayford) as a Pleistocene aberration of *H. caperata* Mont., but not hitherto recorded. After due examination and comparison these shells were referred to *H. candidula* Studer, var. *alpicola* Stabile.

Having recently had an opportunity of studying some of the Woodston examples (kindly lent by Mr. J. Davy Dean) and some twenty specimens of exactly the same form from Ilford (presented by the late Mr. R. D. Darbishire) alongside of authentic specimens of *H. candidula* and its var. *alpicola*, together with the chief literature on the subject, both French and German, I am reluctantly compelled to disagree entirely with the above identification.

¹ Journ. of Conch., vol. 14, 1913, pp. 83–91.

The var. *alpicola* was described by Stabile in 1864¹ as follows:—“[*H. unifasciata*] var. β *alpicola mihi; minor, tenuiuscula, apertura magis rotundata, apice corneo-fusca, fasciis angustis, pallidis, interruptis, evanescentibus*. Haut. 4.5. Diam. 6.5 mill.=*H. alpina*? Megerle non Faure-Biguet.”

A critical examination of the Ilford and Woodston specimens reveals several characters whereby they differ from the above variety, as well as from any form of *H. candidula* with which I am acquainted.

The Woodston and Ilford shells, which are 5-whorled, are distinctly keeled and depressed, and the aperture, instead of being round, is compressed and of a somewhat squarish outline, with a tooth-like protuberance at the base; the umbilicus is large and open, exposing a large part of the penultimate whorl and the interior of the columella; the striation is of the rough type as in *H. caperata* and unlike that of *H. candidula* and its varieties.

The banding is well preserved in many of the shells, and consists of one broad band above the periphery (this band borders the suture of the upper whorls almost to the apex), and two to three broad bands below the periphery. One or other of the latter bands is occasionally split in half, thus producing four bands.

The dimensions of 12 adults from Ilford are:—diam. max. 6.5×3.75 , min. 5.20×3.20 ; alt. max. 3.75×6.5 , min. 3.10×5.30 mm. Three adults from Woodston (in Coll. J.D.D.) measure 6.20×3.75 ; 5.50×3.50 ; 5.50×3.25 mm.

These discrepancies are such as to negative entirely the idea of the specific identity of the Woodston-Ilford specimens (and likewise those from Crayford and Barnwell) with *H. candidula* Studer. They do not appear to agree with any described continental *Helicella*, recent or fossil. German authorities, Dr. F. Haas and others, to whom I submitted specimens, support my contention that they certainly do not belong to *H. candidula*, but are the Pleistocene ancestors of recent English *H. intersecta* (= *caperata*)—so far undescribed and well deserving a name.

This suggestion is interesting but requires further careful investigation. Pending such study, which can only be made when more material is available, it seems desirable that the shell in question should receive some distinctive name, and the most suitable one, in my opinion, is that of *H. crayfordensis* (A. S. Kennard, MS.), as indicating the locality where the species was originally discovered.

ADDITIONS TO "BRITISH CONCHOLOGY."

BY J. T. MARSHALL.

PART VII. (*continued from p. 190*).

Circe Schum.—The claim of *Circe* Schum. against that of *Gouldia* C. B. Adams, having been dealt with by Mr. E. A. Smith,¹ whose conclusions were sustained by Dr. Boog Watson,² subsequently provoked a reply from Professor W. H. Dall in favour of *Gouldia*;³ but Mr. Smith's further elucidation of the subject in the 'Challenger' Reports⁴ may very fairly be taken as settling the controversy in favour of *Circe*.

Venus chione L.—Goodwick Bay, South Wales, odd valves (Vaughan)!

V. fasciata var. **pallida**, var. nov.⁵—Mr. Simpson records some white specimens which were dredged by the Scottish Fishery Board on the Fair Isle Bank in 43f., and at Broad Bay in 6f. This white form is scarce, but generally diffused with the type.

var. **radiata** Jeff.—Freshwater West (Span)! Exmouth. Probably occurs everywhere with the type, but sparingly.

V. verrucosa L.—Mr. David Robertson is said to have obtained a living specimen from off Garroch Head, Clyde, on a fisherman's line; but this and various other Scottish records attributed to this species are extremely doubtful.

V. gallina var. **gibba** Jeff.—Menai Straits; Dornoch Frith. This shell is longer, or less broadly triangular than the type.

Tapes aureus Gmel.—The very young and fry differ from those of other *Tapes* in being circular and resembling the same stages of *Venus*.

T. pullastra Mont.—Gwyn Jeffreys gives the dimensions as 1·5 in. by 1·7 in., but that is an error, and applies to the var. *ovata*; they should correspond to his figure—1·3 in. by 1·8 in.

var. **ovata** Jeff.—Milford Haven (Span)!

var. **plagia** Jeff.—(*Venus plagia* Jeff., Ann. Mag. N. Hist., vol. xix., p. 313).—I am strongly of opinion that this variety is only a form of var. *perforans*, as some specimens of the latter are similarly upturned at one or both ends. Gwyn Jeffreys records only a valve from Lerwick, a small specimen from Deal Voe, and a still smaller

¹ Proc. Zool. Soc., 1881, p. 489.

² Journ. of Conch., 1882, vol. iii., p. 299.

³ Journ. of Conch., 1883, vol. iv., p. 60.

⁴ 'Challenger' Pelecypoda, p. 221.

⁵ Notes on Rare Moll., Journ. of Conch., 1910, vol. 13, p. 111.

one from Loch Fyne, and I suspect that these are specimens of *var. perforans* which have been washed out of their rocky habitat.

T. decussatus L.—I have not met with this species in the Channel Islands save a small specimen at Herm, and Mr. Tomlin has an adult specimen from the same island; but I suspect that Gwyn Jeffreys' record, "on the shores of our southern and western counties,"¹ should apply to the strictly British coasts. Mr. Marquand gives Alderney, and cites "Guernsey and Herm (Tomlin),"² but in the former instance I have seen the specimens, and they prove to be large, coarse examples of *T. pullastra*. There is a tablet of six specimens in the Guernsey Museum, but they are from the British coast proper. There is also a single specimen in the Duprey collection in the Jersey Museum, but without locality, and in his paper Mr. Duprey cites the name only.

Gastrana fragilis L.—Milford Haven (Span and Vaughan)!

Tellina balaustina L.—Straits of Korea 10f. (H.M.S. 'Sylvia')!

T. balthica L.—Very large from Eastbourne, exceeding $1\frac{1}{4}$ in.

T. donacina L.—"A fact in connection with this species, which I believe has not been previously recorded, is the presence of a small internal ligament. This is especially noticeable in young shells, and is placed obliquely behind the cardinal teeth. Several other species also possess this feature."³

Psammobia tellinella var. **gracilis** Jeff.—Gairloch 22f.

P. costulata Turt.—Alderney (Marquand)!

P. ferroënsis var. **pallida** Cockerell (Zoologist, 1887, p. 115).—Tenby (Span)!

Donax vittatus Da Cos.—It is surprising that this very common species has not indisputably been met with in the Channel or Scilly Islands, although Mr. Marquand records a "valve" from Alderney (which, by the way, was a perfect specimen), and cites "Herm (Tomlin)."⁴ It is abundant on the coasts of Normandy and Brittany adjacent to Jersey, and specimens may often be met with in the Jersey fish market, brought with other shellfish from St. Brieuc, St. Malo, Granville, etc. These specimens are larger and broader than our type, are not unlike *var. turgida* Jeff. except in being flatter, and are similar to a form I have received from the Mediterranean as *var. prolongata*.

var. turgida Jeff.—Aberdeen beach, cast ashore (Simpson)!

¹ Brit. Conch., vol. ii., p. 360.

² Marine Shells of Guernsey, etc., Trans. Guern. Soc. Nat. Sci., 1901, p. 6 (sep. copy).

³ E. A. Smith, 'Challenger' Pelecypoda, p. 106.

⁴ Marine Shells of Guernsey, etc., Trans. Guern. Soc. Nat. Sci., 1901, p. 6 (sep. copy).

var. **truncata** Marsh.—Portstewart, Antrim (Knight)! Mochras Island, North Wales (Cooper)! The Marquis di Monterosato writes me that this variety conforms to *D. atlantica* Hidalgo.

var. **cuneata** Marsh.—Besides having the posterior end wedge-shaped and gaping, this variety is smaller, thinner, and much more depressed.

D. trunculus L.—A dealer was selling this pseudo-British species in 1885-6, ostensibly from South Devon, to various collectors for a small sum; but some of the specimens being submitted to me by a purchaser, I was able to recognise them as Mediterranean, and not British as represented, although this dealer may possibly have been himself deceived by a more experienced naturalist. His account to me was that in the spring of 1885 several Brixham trawlers from South Devon, on arriving at his port for the usual season's fishing, brought him some trawl refuse from their coast, and that he found in it eight specimens of *D. trunculus*. However that may be, I subsequently discovered that he was at the same time selling *Cardium papillosum* and *Loripes divaricatus*, also for very small sums, and also ostensibly from the South Devon coast, where these very rare species have never been found.

Mactra solida var. **intermedia** Jeff.—Scarborough, very fine (Tomlin).

M. glauca Born.—The Jersey habitat for this fine shell is situated in a dangerous locality in the south-east part of the island known as La Rocque, and should not be negotiated without a local guide or fisherman, easily to be obtained in the neighbourhood. *M. glauca* is found sparingly in the coarse sandy patches which occur among the rocks, living comparatively near the surface, and easily procurable with a fork or spade; but the safest and most prolific locality is on the further side of a lofty and prominent quadrangular tower, where the rocks terminate and the large sandy bay of Grouville commences. (I have known 40 specimens taken here in one tide). This picturesque tower, situated among a wilderness of rocks, is readily accessible between tides, and is always kept provided with fuel, so that any one cut off by the tides or shipwrecked may obtain shelter and fire until they are relieved. The tides recede here to an enormous distance, while still beyond the uncovered rocks extend for miles towards the coast of France, which is plainly in view. On reaching these rocks and looking backward on Jersey the stranger is at first appalled at the apparent disappearance of the island and at the utter chaos of rocks which surround him. But it is all safe enough while the tides are receding and the key to the position is kept in view; it is when the tides return that the danger is great, as the incoming

rush of waters gradually cuts off rock after rock with surprising suddenness, the tide taking seven hours to recede and only five to return to its high-water mark, which sometimes exceeds forty feet. This dangerous coast frequently claims its victims from among seaweed cutters, conger hunters, and ormer gatherers.

To the islanders of Herm, where *M. glauca* is rare, it has always been known as the "five-shilling shell," as that was the price originally given for it by old collectors when first discovered.

At one time *M. glauca* was sold by the dealers at the then fair price of 7/6, but a Jersey naturalist having offered an expert discoverer 6d. each for as many as he could obtain, to be again retailed at 1/-, he got so inundated with specimens that he had to stop the supply, after "glutting the market."

The animal makes a substantial and appetising *bon bouche*, but the supply for culinary purposes is non-existent. I only once bought a specimen in the Jersey fish market, which was offered for sale as a "clam." The smaller *Mastras* are occasionally eaten. At Teignmouth on one occasion I noticed outside a gipsy encampment a heap of the shells of *M. solida*, which had evidently been cooked and the contents eaten.

Scrobicularia alba var. **oblonga** Marsh.—Garelochhead 16-22f. (Knight)! The specimens from this locality are very thin and glossy, and come wonderfully close to *S. nitida*. In some dredgings by the 'Porcupine' in Vigo Bay, 20f., this was found to be the normal form.

S. piperata Gmel.—Mr. Tomlin finds this species commonly used as food by the peasantry at Torcello and Burano, two outlying islands in the Venetian lagoon.

S. longicallus Scacc.—Between the Shetlands and Norway 197f. and 200f. (Simpson)! Also on the Atlantic slope of the English Channel, about 150 miles off the Scillies, in 717f. ('Porcupine.')

Solecurtus scopula Turt.—Off Peterhead, a perfect specimen and several valves (Dawson); several dead specimens from the Aberdeen Bank on trawl boats (Simpson); Gairloch, valves on the shore after storms.

Ceratisolen legumen L.—Herm, a fine but dead specimen on the beach (Marquand).

Solen ensis L.—Sowerby's figure represents *S. siliqua* var. *arcuata* and not this.

Pandora inæquivalvis L.—Studland Bay, plentiful after gales. Recorded from the Antrim coast by Dr. Chaster, but doubtless a mistake for the var. *pinna*.

Thracia prætenuis Pult.—Gairloch, frequently cast ashore by storms.

var. **villosiuscula** Macg.—A large specimen from St. Aubin's Bay, Jersey, measures $1\frac{1}{2}$ in. by $\frac{7}{8}$ in. An equally large valve has been recorded from Alderney by Mr. Marquand, but erroneously as *Mya truncata*.

T. pubescens Pult.—Mr. James Smith of Jordanhill and the Rev. D. Landsborough have recorded this species from Arran, and Professor Macgillivray has also recorded it from Footdee, Aberdeenshire, "a perfect individual adhering to a fishing line," but these identifications have been held in doubt. *T. pubescens* is only rarely obtainable from the trawlers of Plymouth and Penzance. On one occasion in the sixties a comparatively big haul was made of this rare shell from Cornwall (I suspect in ballast sand), which brought the dealers' price from 15/- down to 5/- each.

A specimen of *Lyonsiella* (or *Pecchiolia*) *abyssicola* M. Sars has been dredged by the Scottish Fishery Board off the Butt of Lewis in 545f., with some fragments of another species of the genus in the same district in 99f. (Simpson)!

Neæra Gray.—Researches in the 'Porcupine' and 'Challenger' expeditions have proved this peculiar genus to be a very extensive one in deep water. In addition to the large number of new species described and figured in the respective reports of these expeditions, there are many others remaining undescribed, besides numerous rostral extremities of other species. The latter projecting portions of the shell appear to be especially liable to breakage, judging from the large number of these rostra that are met with, and their great diversity of sculpture denote that they all belong to different species, and indicate that many more remain to be discovered even in the limited areas traversed by these expeditions.

Neæra abbreviata Forb.—Off the Great Skellig, S.W. Ireland, 79-110f. (R.I.A. cruise)!

N. costellata Desh.—Off the Great Skellig, S.W. Ireland, 79-110f., and off the mouth of the Kenmare River, 23-38f. (R.I.A. cruise)! Sanda Island, Clyde, 19-25f. (Knight)! off Battle Island 40f. (Scott)! Minard Narrows, and off Furnace, Loch Fyne, 10-25f. (Scot. Fish. Bd. Rep., 1897).

N. cuspidata Olivi.—Off Dursey Island, S.W. Ireland, 35f. (R.I.A. cruise); Turnberry, in Ayrshire, 33f., and Lamlash 22f. (Knight)!

Mr. Richard Howse, in "Notes on a Dredging Excursion off Durham,"¹ records a specimen taken from a haddock. Mediterranean specimens differ from British and Norwegian in being smaller and thinner, with a proportionally longer rostrum.

¹ Ann. Mag. N. Hist., vol. xix., p. 162.

N. rostrata Spengl.—Off the Shetlands 111f., a perfect specimen and two valves (Simpson)! The animal has been shortly described by Gwyn Jeffreys.¹

N. obesa Lov. and *N. striata* Jeff. have been dredged off the Butt of Lewis in 530f. by the 'Knight Errant.'

Three specimens of *N. lamellosa* M. Sars have been dredged by the Scottish Fishery Board off the Butt of Lewis in 545f., "with the ribbing nearly obliterated;" several others midway between the Shetlands and Norway in 197f., various other examples between the Orkneys and Faroes in 194f. and off the Faroes in 71f. (Simpson)! while Mr. Tomlin's collection contains two examples of this pretty species from the reputed depth of 160 fathoms off East Shetlands.

Mr. Edgar Smith described in the Annals for 1889 a new species of *Neera* as *N. (Cuspidaria) greeni*, a specimen of which was dredged by the Rev. W. S. Green in the Atlantic off Ireland in 1,000 fathoms, and he identified another valve which was dredged by the 'Triton' Expedition in the Shetland-Faroe Channel in 570f.

Corbula gibba Olivi.—It has been observed that certain specimens of *C. gibba* in the young stage "have spines on the right valve at the anterior side of the beak,"² these spines varying from three to five in number.

Mya truncata L.—St. Aubin's Bay, Jersey, a valve, and there is another in the Jersey Museum. Mr. Marquand's record for Alderney is not this, but a large valve of *Thracia papyracea* var. *villosiuscula*.

var. **abbreviata** Jeff.—Great Fisher Bank, off Aberdeenshire (Simpson)! Gwyn Jeffreys alludes to this form as "the variety *uddevallensis* or *abbreviata*,"³ though in his work he cites var. *uddevallensis* as a separate variety.⁴ They are scarcely the same thing, however. Var. *abbreviata* Jeff. differs from the type only in the posterior end being abruptly shortened; in the var. *uddevallensis* Forb. it is still shorter, and cut obliquely inwards just clear of the beaks, giving it the curious appearance of only half a valve; it is also smaller, more depressed, and very much more solid.

Panopea plicata Mont. — Garelochhead 16-25f., large and perfect but dead; and Lamdash 22f. (Knight)!

Saxicava norvegica Spengl.—From trawl-boats arriving at Grimsby, Scarborough, Aberdeen, etc., rarely containing the animal. East Shetlands 100f., a dead but fresh and perfect specimen. I have also a specimen trawled 40 miles N.E. of Kinnaird's Head which is

1 Moll. 'Lightning' and 'Porcupine,' Proc. Zool. Soc., 1881, p. 939.

2 Massy: "Note on an early spinous stage of *Corbula gibba* Olivi," Journ. of Conch., 1911, vol. 13, p. 191.

3 Arctic Fossils, Ann. Mag. N. Hist., 1877, p. 235.

4 Brit. Conch., vol. iii., p. 70.

3¼ in. by 2¼ in., and another trawled 80 miles N.E. of Aberdeen.

S. rugosa L.—Korea Straits 30-54f., young only ('Sylvia')!

The Rev. Frank Knight dredged a large specimen of this shell at the mouth of the Clyde measuring 1½ in. by ⅝ in. It grows still larger in the Arctic Seas, whence my collection contains a valve from Spitzbergen 2 in. broad by ½ in. deep, and which must have been a veteran, as it is abnormally thick and solid.

S. rugosa is unusually variable, and there is no dividing line between it and its varieties. While some are sharply and others only obtusely keeled, still others have not the slightest trace; some are ridged across the valves, and in others these ridges are serrated, but they all merge one into the other by imperceptible gradations.

The immature forms are especially deceptive, both in their outward appearance and in the nature of their habitat. They live in a free state in the corallines of rock pools, instead of the rocky habitat of their parents. They are depressed and inequivalve, and there is an absence of any distortion, epidermis, or rugosity, until they arrive at a stage when their specific instincts or ambition induce in them a desire to excavate a more secure and permanent home, when they seek the rocks, though in the absence of stone they will put up with oyster shells. *Thracia distorta* is similarly deceptive, and has very similar habits in its young stage, living in corallines and later seeking a shelter, but not excavating, the burrows left by other molluscs in oyster shells or stones, limestone by preference, and while the adults are polymorphous in shape, the young are always regular in form and outline.

var. **pholadis** L.—An unusual specimen from Torbay has the frontal gape, which distinguishes this variety from the type, closed as in *Pholadidea*.

Venerupis irus L.—Alderney, a valve (Marquand)! It is said to have been found at Brodick, in Arran, by the Rev. J. E. Somerville.

Petricola pholadiformis Lam.—This species has come to stay. Mr. T. Edwards in 1899 found it rather plentiful near Herne Bay, between tidemarks, about six inches below the surface, living in the Thanet sand, the lowermost strata of the tertiary group. Mr. Arthur Mayfield has recorded its appearance along the Suffolk coast, Mr. Gyngell from Lincolnshire, Mr. Sikes from the Medway, and Mr. Arthur Smith from Mablethorpe, Lincs. See also a note by Mr. J. E. Cooper in *Journ. of Conch.*, 1899, vol. ix., p. 243.

Pholas dactylus L.—This may occasionally be dug up alive, at low spring tides, from the submarine forest bed on the Torre Abbey sands at Torquay.

P. candida var. **subovata** Jeff.—Paignton, S. Devon.

var. **cylindracea** Marsh. n. var.—Smaller, thin and fragile, and much broader in proportion to length. L. 0.50 in., b. 1.50. From soft peat on Torre Abbey sands, Torquay, with a corresponding variety of *P. dactylus*.

Xylophaga præstans Smith.—Vide Journ. Malac., 1903, vol. v., p. 328.

X. dorsalis Turt.—The Alderney record is an error. I have seen the shells, and they prove to be *Teredo megotara*. In the same paper¹ the record of *Teredo navalis* is also an error for *T. pedicellata*.

Teredinidæ Flem.—It is necessary to study the pallets of the *Teredines*, owing to the confused manner in which several forms will sometimes mix themselves up with the valves in the same piece of wood. The pallet of Sowerby's figure of *T. norvegica*, for instance, is incorrect; it should be as Jeffreys'. The same faults attach to the pallets of *T. navalis* and *T. megotara*. The pallets of the latter species are most variable, Jeffreys' and Sowerby's figures representing the extremes, while those of its variety *excisa* are polymorphous.

Teredo Sellius.—Countless remedies have been tried for overcoming the destructive powers of the *Teredo*, or "ship worm," but it still remains the worst enemy with which marine engineers have to contend. Its powers in that direction may be estimated from the fact that the most substantial timber erections are sometimes riddled within four to six months. Ships may be made immune by metallic sheathing, but not timber erections. The latest method to be adopted for overcoming this destruction and loss to wharves, harbours, and submarine works generally, has been successfully carried out by American contractors, who can now electrocute them by millions, and although the process is not altogether permanent in its effects, yet by occasional applications it is proving sufficient to overcome the difficulties experienced in many extensive operations, and to supersede the use of divers and other highly-skilled operatives. The method of electrocution is carried into effect by the use of a floating electric-power plant, capable of generating heavy currents of electricity at a comparatively low intensity. A network of wires is first lowered into the sea facing the wharf or harbour to be attacked, and these are coupled with one of the poles of the dynamo on the vessel; similar wires are then suspended beneath the ship in electrical contact with the other pole. Directly the current is switched on, electrolytic action occurs in the sea water between the two metal nets, and chlorine gas is thereby liberated. This deadly gas envelopes the *Teredines* in their borings, and speedily causes death.

¹ Marquand: Marine Shells of Guernsey, etc., Trans. Guern. Soc. Nat. Sci., 1903, Suppl.

T. megotara var. **subericola** Macg. (non Jeff.).—This was first discovered and named by Professor Macgillivray, who contributed a paper "On a Species of *Teredo* found in Cork Floats on the Coast of Aberdeenshire," to the Edinburgh New Philosophical Journal, 1832, vol. xxxviii., pp. 138–141.

Siphodentalium lofotense M. Sars. — S.W. Ireland (R.I.A. cruise) ! off Ailsa Craig, 20f., one specimen only.

S. affine M. Sars.—Off the Shetlands, 111f.–125f. (Simpson) ! S.W. Ireland (R.I.A. cruise) ! Sars' figures well represent the differences between this species and *S. lofotense*, though the latter should be a little more cylindrical at the base. Dr. Chaster writes that *S. affine* should be united with *S. lofotense*, because it is "quite impossible to separate the specimens when dealing with them in hundreds; the name *affine* must, therefore, be relegated to varietal rank."¹ And he quotes in corroboration of this extraordinary dictum the fact of my having written "that one form merges into the other." I must repudiate this interpretation of my words; though in outline "the extreme forms of the two species meet," that does not dispose of their specific characters, which are not open to doubt.

S. quinquangulare Forb. has been dredged between the Shetlands and Faroes in 73–197f. (Simpson) ! and in the Atlantic off Ireland in 100–345f. (R.I.A. cruise) !

Cadulus subfusiformis M. Sars.—Atlantic off S.W. Ireland, 345f. (R.I.A. cruise) !

C. jeffreysi Monts.—Atlantic off S.W. Ireland 345f. (R.I.A. cruise) ! also in the Faroe Channel ('Triton'), with var. *tumidula* G. O. Sars !

C. propinquus G. O. Sars has been dredged midway between the Shetlands and Norway in 197f. (Simpson) ! and in the Atlantic off S.W. Ireland in 345f. (R.I.A. cruise) !

C. tumidosus var. *minor* Jeff. has been dredged in N. Shetland in 345f., and also on a shallow bank in the Atlantic off Ireland in 85f. ('Porcupine').

Dentalium L.—With reference to "the separation of the *Dentalia* by the absence (*Dentalium*) or presence (*Entalis*) of the cleft process," Dr. Boog Watson gives some very good reasons why that division "cannot be maintained."²

D. entalis L.—Alderney, "abundant on the shell-beach," and "dredged alive between Guernsey and Herm (Tomlin)."³ These are doubtful identifications.

¹ Proc. R.I. Acad., 1898, vol. v., p. 25.

² 'Challenger' Gastropoda, p. 9.

³ Marquand: Marine Shells of Guernsey, etc., Trans. Guern. Soc. Nat. Sci., 1901, p. 8, sep. copy.

Having subsequently had an opportunity of examining Mr. Marquand's Alderney and other Channel Islands' alleged specimens of *D. entalis*, as well as other shells under that name in the Guernsey Museum, I have found them without exception to be as I suspected *D. vulgare*. Mr. Tomlin's examples I take to be in the same category. Though there would be nothing remarkable in the occurrence of this very common shell in the Channel Islands, yet as a matter of fact I do not know of any reliable record of its presence in those islands. There are certainly no examples in the Jersey or Guernsey Museums, and Mr. Duprey in his list of Jersey shells does not even mention the name.

var. **striolatum** Stimps.—Shetlands 78f. and 82f. (Jeffreys); N. of the Hebrides 189f. and 65of. ('Lightning'); Faroe Channel 57of. ('Triton'); Skye and Hebrides, apparently semi-fossil (Jeffreys). An examination of Norwegian specimens will show the continuity of these two forms as one species. In some parts of Norway they live together and range from the smooth *entalis* to the sculptured *striolatum*. *D. agile* M. Sars and var. *orthrum* Wats. are in the same relation to each other, and although Dr. Boog Watson considers these two forms to be also varieties of *D. entalis*, I think they are sufficiently marked off from that species to stand by themselves.

D. agile M. Sars has been dredged between the Shetlands and Norway in 197f. (Simpson) ! in the Shetland-Faroe Channel 57of. and 64of. ('Triton'), and in the Atlantic off Ireland in 1,00of. (Smith) and in 345f. (R.I.A. cruise). One of the 'Triton' specimens was described by Mr. Jordan as *D. enigmaticum* n.sp.¹ I have seen this shell, which, with his figure and description, is indistinguishable from *D. agile*. He says that he relies on its "persistent ribs and more slender form" to distinguish it from *D. agile*, but as a matter of fact these two characters are never constant in any two examples of the species.

Chiton L.—Montagu described a seven-valved specimen of *C. levis* as *C. septemvalvis*; a six-valved *Chiton* was recorded in the Nautilus for 1901, while a remarkable example of *C. contractus* Reeve, in the Natural History Museum, has only three valves.

C. fascicularis L.—The tubercles on the plates are variable in size; even in specimens found together they are twice as large in some examples as in others, and only half as numerous. In the Salcombe estuary *C. fascicularis* lives near high-water mark, on the sides of caves in the rocks, in company with *Patella vulgata* and *Otina otis*, where they may be found breast high crawling freely among the barnacles.

var. **attenuata** Jeff.—Salcombe.

C. discrepans Brown.—Braye Bay, Alderney (Marquand).

C. debilis Gray.—Sutherlandshire, from haddocks (Baillie) ! off Loch Ryan, 2of., plates only ; Ailsa Craig, 2of., plates ; Mull of Cantire, 3of., plates.

Length, 0.7 in. ; breadth, 0.3 in.

Gwyn Jeffreys has recorded an exceptional specimen an inch in length, dredged by Mr. Barlee in the Shetlands.

C. scabridus Jeff.—Prof. Gwatkin's remark¹ on the radula of this species, he tells me, was meant to apply to *C. lævis*. That of *C. scabridus*, though distinctly different from its congener *C. cancellata*, "is not at all remarkable in the way *C. lævis* is, which wants the major uncinus."

C. cancellatus G. B. Sow.—Tenby and Milford.

C. albus L.—Aberdeenshire, "not uncommon on stones and dead shells from deep water" (Dawson). Being in some doubt of Dr. Dawson's record "not uncommon," I have examined his tablet of six specimens under this name deposited in the Aberdeen University Museum, and I find that four only belong to this species, the remaining two being *C. cinereus* var. *rissoi*. It must still be considered a rare species in British seas.

C. marmoreus Fab.—Sutherlandshire, from haddocks (Baillie)!

Patella vulgata L.—I have already written² on the observations of Gwyn Jeffreys, Mr. Collings of Sark, and myself of the limpet-eating habits of rats. But it would appear that *P. vulgata* is not the only food from marine sources that rats may acquire a taste for, for a fisherman in the Island of Stroma, in the Hebrides, having tracked a huge rat to its lair and killed it, found that it had accumulated a large store of good things, including 115 sand-eels 1 in. long, nine young cod 9 in. long, besides thirty-two birds of various kinds, all neatly and methodically arranged in its retreat. I do not think it is a regular habit of these rodents to store up food, especially as this source of supply is always open to them, but it may be that this particular rat was anticipating the advent of its usual prolific progeny, and had the bump of acquisition abnormally developed. That rats have an unusual capacity for assimilating a varied diet is further borne out by the fact that in the summer of 1912 at Ormsby, in Norfolk, they climbed a plum tree (Victorian) trained against a wall, and devoured the crop before the cause was discovered and measures of prevention adopted.

1 Adds. to Brit. Conch., *Journ. of Conch.*, 1898, vol. ix., p. 63.

2 *Journ. of Conch.*, 1898, vol. ix., pp. 64-5.

In the same paper I also suggested that there may be a connection between limpet-eating rats and the number of Rat Islands scattered round our coasts. One such island (or islet) is attached to Herm, and I have frequently disturbed *Mus rattus* there, but never noticed any stores of its food. Another such named Rat Island is adjacent to the Scillies, while another attached to Lundy Island, in the Bristol Channel, has the reputation of being so called because it was the last refuge of the old English black rat before its final extinction in England, but that is a legend which would equally apply to every Rat Island in the kingdom.

To digress for a moment from conchological matters, *Mus rattus*, the black or Alexandrine rat, is by no means extinct in England, being still occasionally found about the London wharves and docks, while at Great Yarmouth and a few other places it is comparatively common. In the Island of Sark particularly *Mus rattus* has always flourished undisturbed, and the brown or Norwegian rat has never gained a footing there, probably owing to the fact that no ships call at that little island. Where the brown rat does gain a footing, however, it invariably drives away the English black one. Nor is the black rat always nor often black, though it is generally darker than our ordinary brown one, from which it otherwise differs in being a smaller animal, having larger and more expanded ears, with a longer and more slender tail.

Helcion pellucidum var. **lævis** Penn.—I have two white specimens from Benbecula in the Hebrides. One of these is uniformly conical, with the apex erect instead of drooping, which gives it a deceptive resemblance to *Tectura mitra* Esch. from the Aleutian Isles.

var. **elongata** Jeff.—Torbay, not uncommon, but always under stones; Aberdeen, dead on the shore (Simpson)!

Tectura virginea Müll.—Mr. J. A. Hargreaves considers that this species affords an instance of colour protection, at any rate at Scarborough, "the protection being so marked as to render the shell almost invisible even at close quarters."¹ They particularly affect those rocks which are coated with a pink nullipore, with which the pink-rayed limpet harmonises marvellously; "even an experienced collector has to examine the nullipore over and over again to obtain all the specimens exposed, so completely does the background agree with the shell colour." He adds that *Chiton ruber* Lowe "also occurs on this nullipore, on which it is almost invisible."

var. **lactea** Jeff.—Aberdeen, very large (Simpson)!

Lepeta fulva var. **albula** Jeff.—The Minch 65f., off the Butt of Lewis 99f., and Shetlands 51f. and 155f. (Simpson)!

¹ "Protective Resemblance in British Marine Mollusca" *Journ. of Conch.*, 1911, vol. xiii., pp. 215-216.

var. **expansa** Jeff.—The Minch 63f.

Propilidium ancyloides Forb. — Mull of Cantire 19—55f. (Knight) ! off Flugga Light, North Shetlands (Simpson) ! off Loch Ryan 25f.

Puncturella chasteri was a name conferred by Mr. Jordan on an immature example of *P. noachina*.

Emarginula fissura L.—A variety of this shell, from Guernsey, compressed at the sides, is analogous to *Puncturella noachina* var. *princeps*.

E. rosea Bell.—Recorded from Whiting Bay, Clyde,¹ but the identification is more than doubtful.

E. crassa J. Sow.—S.W. Ireland (R.I.A. cruise).

In reference to my record of a specimen of *E. elongata* Costa, from Herm Island,² it may be noted that *Emarginula* abounds on the Herm beach in a bleached and worn condition, among which this species could easily be overlooked ; but if some of the *débris* was searched with special reference to this shell, I think more specimens would be found. *E. elongata* is a most unlikely species to be used in ornamental shell work, or by any other means to stray to this little island, and, therefore, its presence on the Herm beach, in my opinion, is strong *primâ facie* evidence of its existence in the district. I have not paid another collecting visit to Herm since I found this one specimen.

E. cancellata Phil. should be expunged from the British list. A final search which I have made in the Guernsey Museum after the discoverer's (Gallienne's) collection had been laid out, has again failed to reveal the existence of these specimens.

A living and a dead specimen of *Crepidula fornicata* L., attached to a *Fusus antiquus*, have been recorded from the beach at Sandwich by Mr. Cooper ; also from Cleethorpes by Mr. Gyngell ; and from the Medway by Mr. Sikes.

Judging from various specimens of *C. unguiformis* Lam., occasionally sent me from the River Crouch, in Essex, during the past few years, it would appear that the species is destined to become naturalized in this country, together with *Ostrea angulata* Lam., which also seems to have become fairly established ; but careful observation is required to ascertain whether these species breed in our waters before we can claim them as British. Specimens of both species are frequently dredged in the Salcombe estuary, in South Devon, the results of an importation many years ago ; but they are always dead, showing that in this instance at least the conditions were not favourable to their propagation.

¹ Rep. Fish. Bd. Scot., 1896, p. 66.

² Alterations Brit. Conch., *Journ. of Conch.*, 1895, p. 30.

According to Mr. Orton, who has examined its natural history, "it is a protandrous hermaphrodite," which being interpreted in unscientific language means that it is first male and then female.

Crepidula are very prolific, and have multiplied in a marvellous manner on our oyster beds since they were first noticed. Their progeny in the larval stage, like that of many other species, are free swimming, and so capable of rapidly spreading.

They have crossed the Atlantic on American oysters, and when laid down in British waters have combined to rob the British "native" of its legitimate food. This was becoming so serious that the Kent and Essex Fisheries Commission, as well as the Oyster Merchants' Association, directed attention to the advisability of destroying all the so-called "American limpets" that might be caught, owing to the damage and destruction done to the fisheries. They assert that these limpets intercept a great deal of the oysters' food, and were becoming a nuisance to the oyster industry generally. So an edict went forth that all American limpets were to be ruthlessly exterminated.

At recent meetings in London of these authorities it was reported that the measures taken to prevent the increase of these limpets had been successful, though costly. At Colchester during 1912 over one hundred tons of the limpet *débris* had been brought ashore and disposed of, and although this had cost a great deal of money, a serious peril to the oyster trade of this country had probably been averted in time.

At a conversazione of the Royal Society, held on May 8, 1912, the Marine Biological Society exhibited an interesting colony of the *Crepidula*, or "slipper limpet," which, on account of the difficulty of watching them feed under cover of their shells, had been induced to attach themselves to plates of glass, and then fed with specially prepared food of a scarlet colour, when they could be observed daintily selecting the finer morsels to feed upon, and rejecting the coarser particles for the oysters.

(To be continued).

Two hitherto unnoticed varieties of *Helicella heripensis* Mab.—When collecting *H. heripensis* at Princes Risborough in Buckinghamshire, I found very plentifully a white form with strong black-banding, entirely analogous to the var. *ornata* of *H. caespitata*. I would suggest that the analogy be followed and the varietal name *ornata* adopted for this form, which occurs on the ridge of the Chiltern Hills. At E. Fleet and at Coryates in Dorsetshire, I have taken a deep chocolate form of the same species, which might be known as var. *fulva* from the corresponding form of *H. caespitata*.—J. E. A. JOLLIFFE (Read before the Society, May 13th, 1914).

THE RADULA OF HYALINIA.

I.

BY PROF. A. E. BOYCOTT, F.R.S.

(Read before the Society, February 11th, 1914).

PLATE 3.

BEFORE one begins to use the characters of the radula in conjunction with other malacological and conchological features as an aid in the definition of species, it is obvious that one ought to know (1), the changes which are associated with growth in specimens from a single locality; (2), the amount of variation which occurs in specimens of the same size from a single locality; and (3), the variation between examples from different localities. There are many subsidiary points, such as whether the radula is related to age or size, but these three enquiries are fundamental before we can properly discover (4), the difference between different species. I purpose to take up these matters in order, using, in the first place, *Hyalinia helvetica* as material.

"The most likely way," wrote the immortal Stephen Hales not far short of two hundred years ago, "to get any insight into the nature "of those parts of the creation which come within our observation "must in all reason be to number, weigh and measure." A pretty firm conviction that the ingenious minister of Teddington is right has led to the subject being treated in a quantitative or numerical manner whenever such has been possible. The superiority of quantitative over qualitative information is even now not fully recognised; but I would here only remark that the application of methods of measurement to the shells and other parts of snails is an almost unexplored field of immense possibilities which I would commend to the notice of students of the mollusca.

I.—THE GROWTH OF THE RADULA IN *Hyalinia helvetica*.

The snails whose radulæ are dealt with in the present communication were collected at Banstead, in Surrey, in 1911 and 1912, from a small nettle-bed in a hedge-bank, measuring about 4 by 2 yards. By laying down brick-bats and pieces of wood and cardboard, and visiting the place about once a week over a period of some fifteen months, considerable numbers of *H. helvetica* were obtained in various stages of growth; there is no difficulty in recognising quite young specimens, as the black edge to the mantle is present from the first. They were collected at all seasons of the year, for *helvetica* hardly hibernates in that locality,¹ and may, I think, be regarded as all

¹ See Taylor's *Monograph*, vol. iii., p. 50.

belonging to the same "family," using the word in the human sense. At any rate, no greater approximation to homogeneity of material could be attained without resource to artificial breeding which, for the present purpose, is clearly undesirable. The other species found at the same spot were *Hy. cellaria*, *Hy. nitidula*, *Hy. pura*, *Helix hispida*, *Helix rotundata*, *Cochlicopa lubrica*, and *C. elegans*. The locality is dry, about 460 feet above sea level, on chalk, with an annual rainfall of some 28 inches.¹

The snails corresponded in every particular, external and internal, with the species described by J. W. Taylor² as *H. helvetica*. Specimens were submitted to Mr. Taylor, who agreed that they were that species; Mr. B. B. Woodward also identified specimens as *Vitrea rogersi*.³ Whatever the proper name may be, there is, therefore, no doubt as to the sort of snail with which I am dealing.

The radulæ were prepared by soaking and boiling in dilute caustic soda, washing in water, and mounting in Farrant's medium. As far as possible, the same procedure was adopted in every case, so that the results should be as nearly comparable among themselves as could be. I have not been able to make out that such differences in technique as might occur if different people practised what was ostensibly the same method, have any great influence on the form and structure of the radula; but such might be the case.

In all, 125 radulæ have been examined, from shells varying in size (major diameter) from 3.0 to 8.8 mm., no larger specimens having been obtained. The results are summarised in the following tables, the snails being grouped according to the major diameter. Shell dimensions were measured to 0.1 mm. on a microscope with a travelling stage. As regards the number of whorls, it is simplest to explain the procedure which I adopt, by saying that the *helvetica* figured by J. W. Taylor on plate vi. of the third volume of his *Monograph* would be reckoned as having $4\frac{5}{8}$ whorls, the *lucida* $5\frac{1}{8}$; that figures 8, 11, and 14 on plate vi. of the tenth volume of this *Journal* show $5\frac{1}{8}$, $4\frac{7}{8}$, $4\frac{7}{8}$ whorls respectively. The method commonly in use would, I believe, attribute about half-a-whorl more in each instance. My procedure is very likely erroneous; it has, however, been applied consistently. The number of rows—by which I always mean transverse rows—requires no comment; the possibilities of error by reason of the immature rows at the posterior end are familiar to everyone, and are not very material when the comparison between different radulæ is made by the same person under similar conditions. With

¹ *The Water Supply of Surrey*, by W. Whitaker (Geological Survey, 1912), p. 28 and map.

² *Monograph*, vol. iii., p. 45.

³ *Journal of Conch.*, vol. x., p. 309; see also E. W. Bowell, *Proc. Malac. Soc.*, vol. viii. p. 58.

regard to the nomenclature of the teeth in any one row, there is one central tooth, on either side three lateral teeth (which are called laterals whatever their shape), and the rest are marginals. The number of marginals is complicated by the presence or absence of a minute terminal denticle, and by the variation there may be in different parts or on the two sides of the same radula. It is somewhat characteristic of grown-up *helvetica* that the terminal tooth is generally of good size; very small teeth are more frequent in young specimens and in other *Hyalinia*. No arbitrary rule will surmount the difficulty of these small denticles; I have always counted them as each equivalent to one marginal tooth. Where the number of marginals in some parts of the radula is *e.g.* 10 and in other parts *e.g.* 11, the single expression $10\frac{1}{2}$ is used. The total number of teeth is ascertained by multiplying the average number in a row (*i.e.* number of marginals $\times 2 + 7$) by the number of rows, not by individual enumeration. The length and width of the radula were determined from camera lucida outlines. I have relatively less confidence in these results, as the apparent sizes appear to be influenced by the details of preparation and mounting. The characters of the individual teeth were mostly examined at about the tenth row from the posterior end where they have reached their full development but have not become worn.

TABLE I.

Group	Range of diam. mm.	Number of specimens.	Mean diam. mm.	Mean number of whorls.	Number of rows.			Number of marginals.			Total number of teeth		
					max.	min.	mean.	max.	min.	mean.	max.	min.	mean.
I.	3.0-3.9	11	3.47	3.16	39	32	35.7	10	8	9.1	1026	850	903
II.	4.0-4.9	9	4.38	3.56	39	34	36.7	10	8	9.4	999	888	943
III.	5.0-5.9	8	5.22	3.91	42	35	38.1	11	$9\frac{1}{2}$	10.2	1218	945	1044
IV.	6.0-6.9	8	6.36	4.44	41	36	38.7	12	10	10.7	1209	1026	1099
V.	7.0-7.9	66	7.43	4.72	48	36	41.0	13	$9\frac{1}{2}$	11.3	1395	1036	1213
VI.	8.0-8.9	23	8.34	4.90	48	38	41.8	$13\frac{1}{2}$	10	11.9	1632	1107	1287

From these figures it is evident that the growth of *helvetica* from 3 to 8 mm. in diameter of shell is accompanied by (*a*), an increase in the number of rows; (*b*), an increase in the number of teeth in each row; and consequently (*c*), an increase in the total number of teeth on the radula. It is equally evident that at all stages the range of variation is considerable. Thus specimens with 38 or 39 rows might occur in all the groups, and similarly ten marginals is a figure common to every size examined; a radula with approximately 1,000 teeth can be found in each group. At the same time, this variability is not enough to mask the fact of a progressive and pretty regular increase in the number of teeth when the average figures are dealt with, even when these are derived from such a comparatively small

number of individuals. The range and significance of the variation will be dealt with more fully in another communication.

TABLE II.

Group	Major diam.	Mean major altitu.	Mean calcu- lated volu.	Length of radula m.m.			Width of radula m.m.			Area of radula m.m. ²			Length width ratio.	Mean area of 1 tooth. μ^2
	m.m.	m.m.	m.m. ³	max.	min.	mean.	max.	min.	mean.	max.	min.	mean.		
I.	3.47	1.84	4.3	1.44	0.96	1.208	0.34	0.19	0.262	0.39	0.19	0.316	4.6	350
II.	4.38	2.28	8.5	1.68	1.32	1.500	0.34	0.29	0.311	0.52	0.38	0.466	4.8	494
III.	5.22	2.66	13.9	1.88	1.56	1.729	0.40	0.36	0.381	0.71	0.58	0.659	4.5	631
IV.	6.36	3.37	26.4	2.38	1.91	2.142	0.49	0.39	0.460	1.15	0.79	0.985	4.7	896
V.	7.43	3.94	42.1	3.09	2.03	2.401	0.62	0.46	0.528	1.70	1.00	1.268	4.5	1045
VI.	8.34	4.42	58.6	3.14	2.35	2.590	0.68	0.50	0.595	2.11	1.23	1.546	4.4	1201

These data show the increase of size which the radula undergoes as the animal grows larger, compared with the growth of the shell. There is no quality of the radula which is likely to be rationally associated with an increase of the diameter or other linear dimension of the shell. If any, the association may be reasonably assumed to be with the bulk of the animal. Some indication of this is afforded by the volume of the shell. This has been calculated in Table II. on the assumption¹ that the shell is a regular cone, the base being the mean of the major and minor diameters and the height the mean of the major and minor altitudes.² To ascertain the size of individual teeth is an excessively laborious and not very accurate procedure; for the present, therefore, I give the only available summary of the relative sizes of teeth by calculating, from the number of teeth and the area of the radula, the general mean area occupied by one tooth. This method assumes, of course, that the teeth are equally spaced on the basement membrane at different stages of growth, a point which requires investigation.

A better notion of the relative importance of the various changes in determining the difference between a grown-up and an immature radula is obtained if the data are expressed as relative to an arbitrary index. This has been done in Table III., where the data of group I. are taken as 100, and the figures for the other groups reduced to this standard. It appears from this that the size (area) of the radula and the total number of teeth increase much more slowly than the size of the shell; in other words, as is well known, that young snails have relatively large radulae, no doubt in association with the desira-

1 Which gives results about 10% too small in *T. nemoralis* and *T. hortensis*, where I have tested it against direct measurements of volume by weighing in air and water.

2 The volume is then $\left(\frac{\text{diam. maj.} + \text{diam. min.}}{4}\right)^2 \times 3.14 \times \frac{\text{alt. major} + \text{alt. min.}}{6}$. Throughout the present series of *helvetica* the major diameter, minor diameter, major altitude, and minor altitude are in the ratios 100 : 89 : 53 : 35.

TABLE III.

Group.	Shell diam.	Shell volume	Shell whorls.	Rows.	Marginals.	Total teeth in one row	Total teeth	Length	Width	Area	Area of one tooth
I.	100	100	100	100	100	100	100	100	100	100	100
II.	126	198	113	103	103	102	104	124	119	147	141
III.	150	323	124	107	112	109	116	143	145	209	180
IV.	183	614	141	108	118	113	122	177	176	312	256
V.	214	979	150	115	124	117	134	199	202	401	299
VI.	240	1363	155	117	131	122	143	214	227	489	343

bility of more rapid assimilation of food. The figures also show that by far the greater part of the increase in size of the radula is due to an increase in the size of the individual elements, for while the area of the radula increases nearly five times, the number of teeth increases only 0.4 times. It is an interesting speculation as to how far number and size of teeth are related to the efficiency of the organ at different periods of growth, corresponding perhaps to varying dietetic habits. The length of the radula appears to be directly proportional to the diameter of the shell,¹ but the relations between the other measurements are much more complicated.

We may next consider the form of the individual teeth. Here interest centres chiefly about the third lateral and the first marginal denticles, *i.e.*, the third and fourth teeth from the central tooth. Throughout the series the first two teeth are definite laterals, *i.e.*, they have three cutting points. Similarly the fifth and succeeding teeth to the margin of the radula are truly marginal in type, *i.e.*, they have only one cutting point and no reflexion. The third tooth (third lateral) on the other hand, may have one, two, or three points, and the fourth tooth (first marginal) either one or two. The figure shows typical examples of the first five teeth in radulae from different sized snails, all drawn to the same scale with camera lucida.² The third lateral in the smallest specimens has a mesocone only (type E), and is typically marginal in form; endocone³ and ectocone successively develop until a stage is reached in the largest specimens (type A), in which the tooth is of a definite lateral type. The first marginal correspondingly develops an endocone in some of the largest specimens. It will be remembered that a first marginal tooth with a tendency to assume lateral characters has been noted as characteristic

¹ The length of the radula may be calculated pretty accurately by dividing the major diameter of the shell by 2.6.

² H. v. Ihering (in C. A. Westerlund, *Fundamenta Malacologica*, 1892, p. 56) says: "I am wholly averse to the making of drawings of teeth with the camera lucida. . . . It is unnecessarily precise in details!"

³ I use a conventional and intelligible nomenclature. More properly, perhaps, the lateral teeth in *Hyatinia* have no endocone, but a bifid mesocone.

of *Hy. lucida*, while a third lateral tooth of a more marginal type was found in *Hy. alliaria* and some *Hy. "glabra,"*¹ and the same tendency for the first tooth with marginal characters "to move outwards in the series *glabra*, *alliaria*, *cellaria*, *draparnaldi*," is evident in the growth of the radula in a single species.

Something in the way of giving numerical expression to these changes may be done. The endocone of the third lateral may be absent (type E), small (D), or present in good development (A, B, and C). The ectocone may be present (A), represented by a "shoulder," which bears no cutting point (B, C), or absent (D, E). The endocone of the first marginal may be present, though always small (A), or absent (B-E). Table IV. shows how frequently these various forms occurred in the present series; it is obvious that it must sometimes be a matter of opinion whether a cone is "small," or whether a corner or "shoulder" bears a minute cutting point. When an item occurs on one half of the radula and not on the other the fact may be brought into due numerical order by reckoning it as half an occurrence. Thus an ectocone on the third lateral tooth occurs in four of the sixty-six specimens in group V. on both sides, and in four others on one side only of the radula; the total frequency of its occurrence is then reckoned as 6, and (8) is added to denote that it was found in 8 different specimens.

TABLE IV.

Group	I.	II.	III.	IV.	V.	VI.
Specimens examined	11	9	8	8	66	23
3rd lateral: endocone: absent	8	3	0	0	0	0
small	3	6	4	5	16 (22)	1½ (2)
present	0	0	4	3	50 (61)	21½ (22)
3rd lateral: ectocone: absent	9	7	7	6	20 (27)	2 (3)
'shoulder'	2	2	1	2	40 (48)	15½ (17)
present	0	0	0	0	6 (8)	5½ 6
1st marginal: endocone: present	0	0	0	0	6 (7)	2

The other features concerning the shape of the teeth I propose to leave for further discussion. It is not easy to reduce the facts to any absolute and objective form of demonstration; the method of multiple measurements, of which E. W. Bowell has given some examples,² will doubtless prove an important advance. No examples of the truncated central mesocone occurred in the present series.

¹ *Journal of Conch.*, vol. xii., p. 159.

² *Proc. Malac. Soc.*, vol. viii. (1909), p. 380.

CONCLUSIONS.—The radula of *Hyalinia helvetica* is relatively larger in young specimens. The increase in size which accompanies growth of the snail is mostly due to an increase in size of the teeth. There is also some increase in the number of rows, and in the number of teeth in each row. The third lateral and first marginal teeth become more differentiated. In describing any radula, therefore, the size of the individual from which it has been derived should in all cases be stated.¹

The colonisation of *Helix cantiana* in Herefordshire.—In 1891 seventy-nine specimens of *H. cantiana* from near Oxford were turned out on a hedge bank near Hereford. They all disappeared in a few months, and though the place was examined on many occasions nothing more was seen of them till April 1914, when two half-grown specimens were found about 50 yards from the place where the original snails were put. With the exception of a record (which I have never been able to confirm) for Dinmore (some seven miles distant) by H. T. Soppitt, I do not know of the occurrence of this species in Herefordshire, and it appears probable that the attempt at naturalisation was really successful after all. But it is curious that the species managed to remain undetected for 23 years.—A. E. BOYCOTT (*Read before the Society*, May 13th, 1914).

Some New Records from South Wales.—In May last year I was in South Carmarthenshire and Pembrokeshire, and although the time at my disposal was very limited, I managed to add some records to the Census for those counties. These records are marked with an asterisk. I first tried a very small stream close to Kidwelly Castle, where I found **Paludestrina jenkinsi* abundant, *Limnæa truncatula*, *Pisidium casertanum*, *P. nitidum*, *P. pusillum*, and *P. milium*. Next day in a pool near Hoyle's Mouth, Tenby, I got *Valvata cristata*, **Planorbis fontanus*, *P. crista*, and **Pisidium personatum*. In a stream at Manorbier, close to the sea, *Limnæa truncatula*, **Pisidium subtruncatum*, *P. casertanum*, *P. nitidum*, and *P. milium*. In some moss from close to Hoyle's Mouth, besides some very common kinds, I got *Zua lubrica*, *Hyalinia cellaria* var. *albinos*, *H. alliaria*, *H. nitidula*, *H. crystallina*, **Punctum pygmaeum* and *Balea perversa*. I have to thank the Hon. Recorder for having the specimens duly authenticated and the new records marked. He submitted the *Pisidia* to Mr. B. B. Woodward, to whom also my thanks are due.—JOHN WILLIAMS VAUGHAN (*Read before the Society*, March 11, 1914).

¹ I do not propose at present to deal with the literature of the subject, but it is proper to mention that these conclusions are those arrived at by Sterki, whose paper in the *Proceedings of the Academy of Natural Sciences of Philadelphia*, 1893, p. 388, is the *locus classicus* on the matter.

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN & IRELAND.

430th Meeting, held at the Museum, Manchester, March 11th, 1914.

Mr. E. Collier in the chair.

Additions to the Library announced and thanks voted :—

The Librarian reported that the usual periodicals and exchanges had been received.

Donations to the Cabinet and other gifts to the Society announced and thanks voted :—

Two fine specimens of sinistral *Linnaea pereger*, taken May, 1902, by the late Mr. William Nelson, from a pond at King Lane, Moor Allerton, Leeds, presented by "The Nelson Memorial Committee."

From the Hon. Recorder, for the Voucher Collection : *Pisidium henslowianum* from Coquet, near Warksworth, and *Acanthinula aculeata* from Hermitage Woods, Warksworth, Cheviots, both from Mr. A. M. Oliver.

A beautiful framed portrait of the late Mr. William Nelson, taken a week before his death, was presented to the Society by "The Nelson Memorial Committee."

Mr. R. Standen also presented the photographs from which the blocks of the portraits of the late Messrs. R. Cairns and W. Moss, which have appeared in the *Journal*, were prepared.

New Member Elected.

Alan Gardiner, B.Sc. (Lond.), Quies, Porchester Road, Newbury.

Papers Read.

"Some new records from South Wales," by John Williams Vaughan.

"Notes on *Urocoptidae*," G. C. Spence.

The special exhibit of *Urocoptidae* contained very extensive series, 240 species being shown. Mr. G. C. Spence, who has made a speciality of the group, exhibited his fine collection, which included beautiful sections cut to show the varying internal structure of the different genera, and the eggs of *Urocoptis*, *Anoma*, and *Microceramus*, to illustrate his paper dealing with their geographical distribution, habits, and general characteristics.

Fine series were also shown by Mr. J. Cosmo Melvill, including a specimen of the rare *Berendtia taylori* Pfr.; by Mr. E. Collier, including several examples of *Anoma* with perfect tips, a very unusual feature in these generally decollate shells; by Mr. R. Standen, including a fine variety of *Coelocentrum gigas* Pils., with two of its beautiful crystalline eggs, from Guatemala; by Mrs. Gill, and by the Manchester Museum, from the "Layard" and "R. D. Darbishire" collections.

Special exhibits at future meetings :—

April 8th	-	-	-	The section <i>Leptoconus</i> of <i>Conus</i> .
May 13th	-	.	-	The genus <i>Partula</i> .
June 10th	-	-	-	The genus <i>Neritina</i> .

Members are requested to bring or send specimens for comparison and discussion.

431st Meeting, held at the Museum, Manchester, April 8th, 1914.

Mr. E. Collier in the chair.

Additions to the Library announced and thanks voted :—

“Notes on the Evidence of Age afforded by the Growth Rings of Oyster Shells,” by Anne L. Massy. “Holocene Mollusca from Clapham, Yorkshire,” by J. Wilfrid Jackson (*from the respective authors*); and the usual periodicals received in exchange.

Paper Read.

“Cornish Non-Marine Mollusca,” by Alan Gardiner, B.Sc.

Exhibits.

By Mr. J. Kidson Taylor: Some beautiful examples of *Cypræa onyx*, *C. gangrenosa*, *C. hungerfordi* var. *kiiensis*, and other species from Japan; *C. caurica* var. *rosea*; also *Dolicheulota formosensis* and *D. swinhoei* from Formosa.

By Mrs. Gill: An interesting series of shells from Lake Tanganyika, and a very large and perfect specimen of *Conus aulica*, with epidermis intact.

By Mr. G. C. Spence: Specimens of *Brachypodella insulae-cygni* Clapp—a recently described and very beautiful species from Swan Island, Caribbean Sea.

By Mr. Alan Gardiner: Specimens of *Phytia myosotis* var. *denticulata*; *Ovatella bidentata*; *Planorbis complanatus*; *Aplecta hypnorum*, all from Falmouth, Cornwall.

In the special exhibit of the section *Leptoconus*, numerous examples were shown by Mrs. Gill, and the species in the Manchester Museum Collection were shown by Mr. R. Standen, who pointed out the chief features characterizing the group, and made some remarks upon its distribution, with special reference to the many interesting species dredged, or obtained from the telegraph cables in the Persian Gulf by Mr. F. W. Townsend.

432nd Meeting, held at the Museum, Manchester, May 13th, 1914.

Mr. B. R. Lucas in the chair.

Additions to the Library announced and thanks voted :—

“Manual of New Zealand Mollusca” [text only], by Henry Suter (presented by the High Commissioner for New Zealand).

“The International Directory of Malacologists and Conchologists, 1914,” by Maxwell Smith (presented by the compiler); and the usual periodicals received in exchange.

Candidate Proposed for Membership.

Herbert W. Worsfold, 28, Melody Road, Wandsworth, London, S.W.

Papers Read.

“The Colonization of *Helix cantiana* in Herefordshire,” by Prof. A. E. Boycott, F.R.S.

“Note on the Radula of *Pyramidula rupestris* Drap.,” by E. W. Bowell.

“Two hitherto Unnoticed Varieties of *Helicella heripensis* Mab.,” by J. E. A. Jolliffe.

“Note on Large Specimen of *Arion ater* var. *rufa* and on *Testacella scutulum* Sow.,” by B. Bryan.

“*Jamiania cylindracea* DaC. with Two Denticles,” by J. E. A. Jolliffe.

Exhibits.

By Mr. J. D. Dean: An interesting series of land shells, collected recently in the vicinity of Cardiff, including fine sets of *Hyalinia lucida* and *H. cellaria*;

Pupa cylindracea var. *albina*; *Vertigo antiwertigo*; *Acanthinula aculeata*; *Punctum pygmaeum*; *Helix hortensis*, 00300; *Acicula lineata*; and *Cacilioides acicula* (collected by Herr Christien Abel).

By Prof. A. E. Boycott: *Theba cantiana* from Herefordshire—progeny of a colony introduced about twenty years ago; also lantern and micro. slides to illustrate the Rev. E. W. Bowell's paper on the radulae of *Pyramidula rupestris* and *P. rotundata*.

By Mr. C. H. Moore: *Sphyradium edentulum* from St. Asaph, Flintshire, and cameo cut from *Cassia rufa*.

By Mr. R. Standen: Eggs of *Hygromia rufescens*.

The Special Exhibit of the evening was the Genus *Partula*, of which about two-thirds of the known species were shown by Mrs. Gill, Messrs. B. R. Lucas, G. C. Spence, and R. Standen. The fine series from the Layard and Darbshire Collections in the Manchester Museum were also shown. Mr. R. Standen gave an interesting account of the principal characteristics of the shells in this genus, and described their peculiar geographical distribution. He also exhibited the calcareous eggs of *P. canalis* from Samoa, and *P. garynede*s from Marquesas.

CENSUS AUTHENTICATIONS.

By W. DENISON ROEBUCK, F.L.S., HON. RECORDER.

All the records here given are based upon examples sent to the official authenticators: myself for slugs only; Mr. Fred Taylor for *Paludestrinids*; and Mr. John W. Taylor for all other species.

Cardiganshire: Mr. Thomas H. Platt, collecting at Cwm Woods, Aberystwith, 24th August, 1913, found several species, including one each of *Hyalinia radiatula*, *Zonitoides nitidus* and *Punctum pygmaeum*.

Co. Cavan: Mr. J. Kidson Taylor's collection includes several examples of *Clausilia laminata* from Farnham, one of its very few Irish stations.

Cheviotland: Mr. A. M. Oliver has submitted *Punctum pygmaeum*, of which he found a single specimen in moss from the sandhills near Alnmouth, 8th February, 1913; also an adult example of *Milax gigates* var. *rava*, which he took 6th July, 1913, in the garden of Church Hill House, Warkworth, on the north bank of the Coquet River.

Cornwall West: Mr. W. Denison Roebuck observed *Arion intermedius* var. *grisea* at Mylor, at Trefusis Point, and at Gweek, on the 29th and 23rd September.

Glamorganshire: On the 29th May, 1913, Mr. W. J. R. Firth sent an interesting series of mollusca found at Treharris, amongst which was a fine example of *Hyalinia helvetica*.

Gloucestershire West: Prof. A. E. Boycott has recently submitted *Unio margaritifera*, taken in the River Wye, near Staunton.

Herefordshire: Prof. A. E. Boycott has submitted examples of *Succinea elegans* and *Planorbis albus*, both taken near Hereford.

Huntingdonshire: The Rev. C. E. Y. Kendall has sent *Vallonia costata* from Chesterton (several), *Pupa cylindracea* from Alwalton (numerous), *Vertigo pygmaea* from Elton (two), and *Bythinia tentaculata* from Farcet Fen (several).

Kincardineshire: A small consignment of slugs obtained by the Rev. J. R. Fraser, at Kinneff, included an adult example of *Arion hortensis*, very pale-coloured and with the orange slime of the foot-sole pale also.

Lancashire South: Mr. Fred Taylor found several *Arion intermedius* var. *grisea*, in company with *Agriolimax lævis*, on stones about roots of grasses near Agecroft Pool, 25th October, 1913. There are numerous examples of *Vallonia excentrica* in Mr. J. Kidson Taylor's collection, collected by Mr. J. R. Hardy at Chorlton.

Monmouthshire: In July, 1904, Mr. John Manners, noticing in the daily press a statement as to slugs being desired for record, sent some found in the flower-borders of his garden, 39, Rose Cottages, Talywain. They included abundance of *Arion subfuscus* var. *cinereofusca*, a couple of var. *rufofusca*, a juvenile *Arion ater* var. *nigrescens*, a typical *Agriolimax agrestis*, and an adult *Limax maximus* var. *cellaria*, the last-named being a new county record. One curious thing about this is the fact of *Arion subfuscus* being the abundant species in a garden.

Northumberland South: To confirm the authentication for this county which has hitherto rested on the uncertain record of "near Newcastle," Mr. A. M. Oliver has submitted examples of *Azeca tridens* which he found 26th June, 1912, near Lipwood House, Haydon Bridge. The two sent were of the var. *nouletiana*.

Oxfordshire: Mr. J. E. A. Jolliffe submitted on the 19th November, 1912, an example of *Helicella heripensis* taken just outside Oxford city.

Peebles-shire: Mr. J. E. Black has recently sent a couple of juvenile examples of *Hyalinia radiatula*, taken in moss on a hillside (about 800 feet alt.) near Peebles, 16th May, 1913.

Ross East: Fleet-Surgeon K. H. Jones, R.N. sent a few slugs taken at Cromarty on the 7th October, 1913, which included *Arion ater*. The following day he sent—amongst others—a few juvenile typical examples of *Limax arborum* and of *L. maximus* var. *fasciata*.

Co. Sligo: Numerous specimens from Sligo, collected by Mr. R. Welch, of *Planorbis crista*, including the three varieties *cristata*, *imbricata* and *levigata*, are in the collection of Mr. J. Kidson Taylor.

Somerset North: Miss Agnes Fry of Failand, sent a number of interesting slugs collected there on the 14th of May, 1913, seven species, of which *Arion subfuscus* (several of var. *rufofusca*), *A. circumscriptus* (several of var. *neustriaca*) and *Limax arborum* (one adult of the typical form) are new to the Census.

Warwickshire: Mr. P. T. Deakin of Birmingham has submitted examples of *Clausilia laminata* and *Helicigona lapicida* collected by him at Wawensmoor, near Shelfield, on 24th September, 1911; and of the latter species collected near Sernal, 17th April, 1911.

York Mid.-West: Several examples of *Vallonia excentrica* from Ingleton are in Mr. J. Kidson Taylor's collection.

York North-West: In a box of shells collected at Deepdale, near Barnard Castle, in 1882, by Mr. R. Rimmer, now in the Royal Scottish Museum at Edinburgh, is an example of *Helicella virgata*. This is a record which it is desirable to have confirmed.



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PLATE 4.



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VOL. 14.

OCTOBER, 1914.

No. 8.

MOLLUSCAN RUBBER PESTS.

By G. C. ROBSON, B.A.

(Published by permission of the Trustees of the British Museum).

(Read before the Society, Sept. 9th, 1914).

I AM indebted to Prof. R. Newstead, F.R.S., and Mr. E. Ernest Green for information on the following instances of damage occasioned by Mollusca in rubber plantations in Jamaica and Ceylon. These cases have been more fully recorded elsewhere but through the courtesy of Prof. Newstead and Mr. Green I am enabled to draw the attention of students of the Mollusca to them, and at the same time to state that I shall be very glad to receive information of similar instances of ravages caused by Mollusca.

In the Journal of the Royal Horticultural Society (vol. xxxvi., pt. 1, 1910) Prof. Newstead described the depredations of a large flat slug in Jamaican plantations of Para and Central American rubber, in which quite a large percentage of young trees had their foliage injured by the slug. Specimens of the latter were forwarded to the British Museum this year and identified by the author as *Veronicella vittata* Ckll.

In the "Circulars and Agricultural Journal of the Royal Botanic Gardens, Ceylon" (vol. v., no. 22, 1911) Mr. E. E. Green describes the damage to Singhalese rubber plantations caused by a Zonitoid of the sub-family *Helicarioninae*, *Mariaella dussumieri* Gray, and other short references to the same pest occur in the "Tropical Agriculturalist," xxxiii., 2 and 5, and xxxvi., 1909-1911.

Mr. Green likewise calls the author's attention to the case of a species of *Parmarion* that is alleged to drink rubber latex in Java and Sumatra.

NOTE ON BURSA (TUTUFA) RUBETA (Bolten)=TRITON
LAMPAS (Lamarck et auct).

By EDGAR A. SMITH, I.S.O.

(Read before the Society, September 5th, 1914).

PLATE 4.

THE purpose of the present note is to call attention to the great variation in size, form, and sculpture which occurs in the shells commonly known as "*Triton lampas*," but described by Linnæus in section γ of his genus *Murex*. Extraordinary differences in size frequently occur in many species in various genera, but in the present instance considerable difference of form and sculpture accompanies that of size.

It may be of interest to give a few instances of variation in size in certain well-known shells, the measurements being taken from examples in the National Collection, but even in any one of these cases it is quite possible that the limit of difference which may exist is not reached.

		Length or Width in Millimetres.
<i>Strombus floridus</i>	...	20 to 37
<i>Cassis testiculus</i>	...	32 „ 84
<i>Buccinum undatum</i>	...	50 „ 130
<i>Thais lapillus</i>	...	18 „ 54
<i>Littorina littorea</i>	...	17 „ 53
<i>Cypræa arabica</i>	...	33 „ 90
„ <i>moneta</i>	...	13 „ 38
<i>Linnæa stagnalis</i>	...	20 „ 68
<i>Planorbis corneus</i>	...	17 „ 43
<i>Helix aspersa</i>	...	20 „ 47
<i>Mytilus edulis</i>	...	19 „ 92
<i>Cardium edule</i>	...	20 „ 65

Linnæus in the 10th edition of the 'Systema Naturæ' founded his *Murex lampas* upon two figures. The first one quoted is in Rondeletius¹ which undoubtedly represents "*Triton nodiferum*" Lamarck from the Mediterranean. The second figure in Gualtier² is very crude but may represent a form (immature) of *Triton lampas* of authors—the species under consideration. Linnæus gave Mediterranean for the habitat. There can be no question as to what shell is represented by Rondeletius' figure (reversed like all the others in his book).

¹ Universæ Aquat. Hist., p. 81, 1555.

² Index Test. Conch., pl. L, fig. D, 1742.

He does not state the size of his specimen, so possibly his figure may be reduced, and have been taken from a shell of much larger dimensions than those indicated by the engraving. However, all the characters of "*Triton nodiferum*" are depicted. The general form is correct, the brown marks or stripes on the labrum (never occurring in *rubeta*) with the white tubercles at their inner ends, the two rows of nodules on the penultimate whorl with the spiral ridges below the sutures, the white smooth interior of the aperture and the transverse columellar ridges are either all shewn in the figure or described, and the absence of a posterior canal at once distinguishes it from "*Triton lampas*" auct.

Linnæus in the 12th edition of the 'Systema,' in addition to Rondeletius and Gualtier, quoted two figures in Rumphius¹ which represent forms of *T. lampas* auct. However, he still repeats the "Habitat in M. Mediterraneo." Taking into consideration all these facts, it seems to me obvious that the *Murex lampas* of Linnæus must be confined to the Mediterranean shell, commonly known as "*Triton nodiferum*" Lamarck.

To transpose the name *T. lampas*, applied to a well-known shell, to another species, equally well-known by a commonly received name, does not seem advisable, still it must be done if we abide by the evidence before us.

Bolten² had already (1798), before Lamarck's time, given a name to this Mediterranean species, so that in any case the name "*nodiferum*"³ cannot be used. Moreover the Australian "*Triton australe*" Lamarck, said to be the same as "*T. nodiferum*," has an older name, viz., *Septa rubicunda* Perry, 1811.

The question now arises what name should be given to *Triton lampas*, auct.

The two figures in Rumphius, already referred to, namely pl. xxviii, figs. c,d, certainly represent forms of *T. lampas*, auct. To these which he regarded as illustrating forms of his *Murex lampas*, Linnæus gave the varietal names *Bubo* and *Rubeta* respectively.

Gmelin also adopted these varietal names, and gave further references to figures representing them. Among these are two quotations from Chemnitz, Conch. Cab., vol. iv., pl. 129, figs. 1238-9, representing *Bubo*, and figs. 1236-7 illustrating *Rubeta*.

These names were adopted in a specific sense by Bolten, excepting that he wrote *Bufo* instead of *Bubo*, a change suggested by Chemnitz as being a typographical error in the Systema. However there is no

1 Amboinsche Rariteit-Kamer, pl. xxviii., figs. c, d, 1705.

2 Mus. Bolten p. 125. *Tritonium opis*.

3 *Triton* was wrongly considered of the neuter gender by Lamarck.

doubt what shells Bolten intended to call *Tritonium rubeta*, founded on Chemnitz figs. 1236-7.

These evidently represent the red-mouthed form of the species under discussion, and which I have indicated as typical.

I propose therefore to use the specific name *rubeta* instead of *lampas* which I have shown must be applied to the Mediterranean "*Triton nodiferum*" of Lamarck.

The synonymy will consequently be as follows:—

Bursa (Tutufa) rubeta (Bolten).

Murex lampas Linn. partim, Syst. Nat., ed. x, p. 748; ed. xii, partim p. 1216; Gmelin, partim, Syst. Nat., ed. xiii, vol. vi, p. 3532.

Tritonium rubeta Bolten, Mus. Bolt. p. 128 (1798).

Tritonium tuberosum, id. op. cit. p. 127.

Tritonium bufo, id. op. cit. p. 128, probably=my var. *gigantea*.

Triton lampas Lamarck (and other authors) Anim. sans. Vert., vol. vii., p. 180 (1822).

Lampas hians Schumacher, Nouv. Syst. Test. p. 252 (1817).

Tutufa lampas Jousseaume, Bull. Soc. Zool. France, vol. xvi., p. 175 (1881).

Tutufa caledonensis, id. op. cit. p. 177 (under genus *Lampas* by mistake).— See fig. 2 on the accompanying plate.

It is curious that Bolten founded his *Tritonium tuberosum* on the same figures in the Conchylien-Cabinet which he quoted as representing his *T. rubeta*. Although the latter name appears one page later, I prefer to suggest its use, since it was proposed by Linnæus, although in a varietal sense.

Some of the subdivisions of the genus *Bursa* do not appear to be of much value or very clearly defined, and I have been in some doubt with regard to the subgeneric name which should be applied to this species.

Bursa of Bolten is practically the equivalent of *Ranella* of Cuvier and Lamarck, and antedates it by nineteen years, and consequently there is no difficulty as to what generic name should be employed. Jousseaume¹ selected from the species quoted by Bolten², *B. bufonia* Gmelin (= *mammata* Bolten) as the type.

The genus *Lampas* was created by Schumacher³ in 1817 to include *Murex lampas* as illustrated by Chemnitz (Conch. Cab., vol. iv., figs. 1236-1239), but that generic name had already been employed in 1808 by Montfort⁴, and therefore is not available. Jousseaume in 1881 founded a genus *Tutufa*, designating the same species, *Murex lampas* as the type.

¹ Bull. Soc. Zool. France, vol. vi., p. 174 (1881).

² Mus. Bolt. p. 128.

³ Nouv. Syst. Test. p. 252, *Lampas hians*.

⁴ Conch. Syst. vol. i., p. 242.

Schumacher (1817) in founding his genus *Bufonaria* included two very different forms, namely *spinosa* Schumacher and *scrobiculator* (Linn).

The former (= *spinosa* Lamarck, 1822) however was selected by Jousseaume as the type, and the latter he placed in his genus *Tutufa*.

On the other hand the *Murex scrobiculator* Linn. has been selected by Dr. Dall¹ as the type of *Bufonaria*, but since Jousseaume had already chosen the type and given the name *Tutufa* to *T. lampas*, auct. which certainly belongs to the same group as *M. scrobiculator*, I think it would have been better if Dr. Dall had used that subgeneric name instead of *Bufonaria*, already disposed of by Jousseaume.

There seem to be three or four forms of *Bursa rubeta* which can be distinguished.

VAR. 1. **Typical** (fig. 1).

The first is that indicated in Lamarck's description², and figured in the Encyclopédie Méthodique³, also by Wood⁴, Blainville⁵ and Lister⁶.

This form may be known by the bright red mouth, the much wrinkled columella, the widely expanded labrum bearing twelve whitish subtubercular liræ, and a second series of liræ within the aperture corresponding to those on the labrum, but separated from them by a narrow smooth interval. The largest specimen I have seen is only 110 mm. in length, and I have no reason to suppose that it ever greatly exceeds this size.

Hab.—Timor, Goram I., Tonga Is., Port Natal (Brit. Mus.), Islands of Ticao and Luzon, Philippines (Cuming), New Caledonia (Jousseaume).

The description of the hitherto unfigured *Tutufa caledonensis* (fig. 2.) seemed to agree so closely in many respects with the *Triton lampas*, auct. that I applied to Dr. Jousseaume for the loan of a specimen for examination. He very kindly sent me one of the two examples still in his possession, and now I have no hesitation in pronouncing it the same as the var. 1 with the thin expansion of the labrum undeveloped. At this stage of growth, just after the labral varix has been completed, and the thin expansion commenced, the dark brown denticles on the edge are apparent. With the growth of the expansion they become covered, but their position is still indicated by a slight tubercular prominence on the ridges which run from the 12 liræ to the margin of the expanded lip.

1 Smithsonian, Miscel. Coll., vol. xlvii., p. 119 (1905).

2 Anim. sans Vert. vol. vii., p. 180 (1822).

3 Ency. Méthod. pl. 420, figs. 3a—b.

4 Index Test. pl. xxv., fig. 28.

5 Manuel Malacol. pl. xviii., figs. 1, 1a.

6 Hist. Conch. pl. 1023.

VAR. 2. **lissostoma** Smith (fig. 3).

The second variety is that figured by Reeve¹, Tryon², Kiener³, and Kobelt⁴, and may be known from the preceding form by its longer aperture, almost smooth columella, and the absence of the liræ within the mouth. It has the twelve tubercular liræ on the labrum, but not those further within. The edge of the columella, and the aperture within the whitish or flesh-coloured labrum are generally of a deep or bright red.

Length of an average specimen about 110 mm., of a larger specimen 150 mm.

Hab.—Indian Ocean, Madagascar, Red Sea (Kiener).

I regret to say that I cannot state any certain localities for this variety. It is quite separable at a glance from the preceding form. Can the differences indicated possibly be sexual?

VAR. 3. **gigantea** Smith (figs. 4, 5).

The third variety grows to an enormous size, and is that form (fig. 4.) figured by Reeve⁵, and perhaps by Chemnitz⁶. The aperture within is either white or fleshy orange, and the columella is transversely finely lirate above the middle, and more strongly below. The labrum in adult examples is broadly expanded, dentate at the edge, and very faintly ridged within, the ridges corresponding to the denticles (generally brown) on the margin. Usually there are one or two denticles posteriorly, opposite a strong lira at the upper part of the columella.

In a young example of this variety the faint ridges within the labrum take the form of distinct elongate tubercles as in variety 1.

Two enormous specimens from Muscat (fig. 5) on the Arabian Coast, Gulf of Oman, may be placed in this variety although they appear to have less of the tubercular sculpture shown in Reeve's figure. One of these has the aperture, columella callus, and labrum entirely white, but in the other these parts are of a flesh tint.

The larger specimen is 360 mm. in length and weighs 4 lbs. 6 oz., whereas an apparently full-grown example of var. 1 weighs only 4 oz., but I should state at the same time that an apparently adult specimen of this third variety weighs but 10 oz.

Chemnitz (Conch. Cab. vol. iv., p. 87) states that he had a specimen from Mauritius or Bourbon in his collection, 14 inches long, and that Spengler had still larger examples.

The contrast between var. 1 and these gigantic specimens is so great, that at first sight it seems ridiculous to consider them forms

1 Conch. Icon. vol. ii, pl. x, fig. 30b.

2 Man. Conch. vol. iii., pl. xix, fig. 12, copy of Reeve.

3 Coq. Viv. pl. v, fig. 1.

4 Illustr. Conchylienbuch, pl. ix., fig. 2.

5 Conch. Icon. vol. ii., pl. ix, fig. 30a.

6 Conch. Cab. vol. iv., fig. 1238.

of the same species. However, in the large series I have examined, the connecting links appear to be present.

VAR. 4. *tenuigranosa* Smith (fig. 6).

The last, or fourth variety, might perhaps be regarded as a finely sculptured form of var. 3. The aperture, columellar callus, and labrum are entirely white, the columella is finely lirate above and more strongly anteriorly. Not one of the three specimens at hand is adult, and the character of the labrum is like that of the young shell of var. 3 described above. The peculiarity of this fourth variety is the much finer granulation of the surface. The largest specimen is 193 mm. in length.

Hab.—?

EXPLANATION OF PLATE IV.

Fig. 1. *Bursa (Tutufa) rubeta* (Bolten), Typical.

Fig. 2. *Bursa (Tutufa) rubeta* with undeveloped labrum = *cal-
edonensis*, Jousseume.

Fig. 3. *Bursa (Tutufa) rubeta* var. *lissostoma* Smith.

Fig. 4. *Bursa (Tutufa) rubeta* var. *gigantea* Smith. Specimen in
the Cuming Collection.

Fig. 5. *Bursa (Tutufa) rubeta* var. *gigantea* Smith. Specimen from
Muscat.

Fig. 6. *Bursa (Tutufa) rubeta* var. *tenuigranosa* Smith.

All figures about one fourth the length of the specimens.

Cæcilioides acicula, *Vallonia excentrica*, etc., in Denbighshire.—At the latter end of September, 1913, I visited the famous Cefn Caves, in the Elwy Valley, Denbighshire, along with Mr. R. Standen and others, and in the space of half-an-hour we made a rapid survey of the ground round about in search of shells and woodlice. Finding our time so limited, we gave up the search for living examples, and devoted the last five minutes or so to filling a small calico bag with the loose soil and shell-débris hanging on the narrow rock ledges about the caves. On working through the material at home we were surprised with the result. The following comprises the full list of shells obtained in this way, the majority, of course, being dead examples, but quite recent in appearance :—*Agriolimax agrestis* (two shields); *Vitrina pellucida*; *Vitrea crystallina*, *V. cellaria* (and var. *albina*); *V. rogersi*, *V. nitidula*, *V. radiatula*; *Arion ater* (granules); *Punctum pygmaeum*; *Pyramidula rupestris*, *P. rotundata*; *Helicella caperata*; *Hygromia hispida*; *Acanthinula aculeata*; *Vallonia costata*, *V. excentrica*; *Helix aspersa*, *H. nemoralis*; *Cochlicopa lubrica*; *Cæcilioides acicula*; *Jamnia cylindracea* (and var. *curta*); *Vertigo pygmaea*, *V. substriata*; and *Clausilia bidentata*. Mr. Charles Oldham visited these caves in 1896, and obtained quite a number of shells in an hour's collecting. Some twelve of the shells in his list (*J. of Conch.*, viii., p. 251) are additional to ours, while some sixteen of ours are additions to those he found. We quite agree with him that this beautiful valley would repay systematic work, but one must not be handicapped with having to catch conveyances back home.—J. WILFRID JACKSON (*Read before the Society*, Feb. 11, 1914).

THE RADULA OF HYALINIA.

II.

Variation in the Radula of *Hy. helvetica*.

By A. E. BOYCOTT.

(Read before the Society, February 11th, 1914).

THE object of the present enquiry is to ascertain the extent to which the radula of *H. helvetica* is subject to "spontaneous" variation. The preceding paper (*supra* p. 214) has shown that the size factor must be eliminated by using individuals of approximately the same dimensions: it is also plain that the possible influence of race and locality must be excluded by taking the material from a single restricted area. Some of the snails already dealt with are suitable for our present purpose. Strictly speaking, perhaps, all should be of precisely the same size, but it is of some importance that the number of observations should be numerous, and I propose to deal with the 66 specimens with major diameters of from 7.0 to 7.9 mm. as if they formed a truly homogeneous size group.¹ There are also 23 specimens between 8.0 and 8.8 mm. in diameter which afford another series. The details for each specimen are shewn in Tables I. and II. The method and terms used have been already described (*supra* p. 215).

The statistical methods of expression which are used can only be very briefly explained.² Suppose a series of five measurements gives the results 8, 9, 10, 11, 12. Then the *mean* is $\frac{8+9+10+11+12}{5} = \frac{50}{5} = 10$. Take the differences between each measurement and the mean (2, 1, 0, 1, 2); square them (4, 1, 0, 1, 4); add the squares together (10); divide the sum of the squares by the number of observations $\frac{10}{5} = 2$; take the square root of the result = 1.41, which is the *standard deviation*. The *coefficient of variation* is the per centage of the standard deviation on the mean, in this case $\frac{1.41 \times 100}{10} = 14.1$ and is the measure of the variability by means of which we can compare the variability of one shell or organ with another. The process is simpler than it seems.

Working out the detailed figures along these lines, we obtain the following summary results for the 66 snails of the 7.0—7.9mm. group.

¹ This group is taken simply because it comprised the greatest number of larger snails. In the particular locality shells over 8 mm. were not common, and those over 7 mm. were anatomically sexually mature. It would have been more convenient to have taken an 8.0 to 8.9 mm. group.

² For a most lucid and non-mathematical exposition of this important subject see G. U. Yule: *An introduction to the theory of Statistics* (London: Griffin & Co., 1912).

	Maximum	Minimum	Mean	Standard deviation	Coefficient of variation
Number of Rows ...	48	36	40.98	2.585	6.3
Number of Marginals ...	13	9½	11.265	0.604	5.4
Teeth in one row ...	33	26	29.530	1.209	4.1
Teeth in Radula ...	1395	1036	1213.2	93.76	7.8
Length of Radula—mm. ...	3.09	2.03	2.401	0.219	9.1
Width of Radula—mm. ...	0.62	0.46	0.528	0.034	6.4
Area of Radula—mm. ² ...	1.70	1.00	1.268	0.154	12.1
[Major diameter of shells	7.9	7.0	7.43	0.244	3.3]

The significance of these figures is this. The range of normal variation in biological sizes is such that practically all individuals are smaller than the mean *plus* three times the standard deviation and larger than the mean *minus* three times the standard deviation. Nineteen out of twenty normal individuals differ from the mean by less than twice the standard deviation, and about two-thirds by less than once the same figure. If then the standard deviation were 5% of the mean—if, in other words, the coefficient of variation were 5—we should expect to find specimens pretty quickly which varied from the mean by 10% and we should regard as probably abnormal or belonging to another category of classification any individuals which differed from the mean by more than 15% or thereabouts.

The following will serve as examples of the distribution of the values under consideration: any of the others may be readily extracted from the tables.

	Number of rows	Number of specimens	Number of teeth in one row	Number of specimens	Length of Radula	Number of specimens
	36	2	26	1	2.00—2.09	2
	37	3	27	0	2.10—2.19	8
	38	9	28	12	2.20—2.29	16
	39	7	29	22	2.30—2.39	11
	40	7	30	14	2.40—2.49	9
	41	11	31	16	2.50—2.59	9
	42	8	32	0	2.60—2.69	6
	43	4	33	1	2.70—2.79	1
	44	10	...	...	2.80—2.89	1
	45	4	...	...	2.90—2.99	1
	46	0	...	...	3.00—3.09	2
	47	0	...	...	...	...
	48	1	...	...	...	...
Limits of twice st. dev.	35.8—46.1		27.1—31.9		1.97—2.84	
Limits of three times st. dev.	33.2—48.7		25.9—33.2		1.54—3.28	

In each instance it will be seen that all of the 66 individuals come within the range of the mean \pm 3 standard deviations. In the case of the number of rows one, in the number of teeth three and

in the length of radula three, individuals exceed the limits of twice the standard deviation. For the number of rows and the number of teeth in a row one would therefore expect to find commonly a variation of about 10% on either side of the mean, and any single radula with 37 to 45 rows, or with 26 or 33 teeth in a row, could not be considered as necessarily different in that respect from that of a Banstead *helvetica* of about 7.5 mm. diameter. The case would, of course, be quite different if a *series* of radulæ gave such a result as an average. The necessity of examining a number of specimens in any case is apparent.

TABLE I.

66 snails 7.0—7.9 mm. major diameter.

Diam	Rows	Marg.	Long	Wid e	Endo. 3rd lateral.	Ecto. 3rd lateral.	Endo. 1st Margin	Diam	Rows	Marg.	Long	Wide	Endo. 3rd lateral	Ecto. 3rd lateral	Endo. 1st Margin
7.0	42	11½	2.59	0.58	†	o	o	7.5	44	12	2.38	0.57	†	sh. : †	o : tr.
	42	12	2.40	0.56	†	sh.	o		42	11	2.25	0.55	† : sm	sh. : o	o
	44	11½	2.24	0.50	†	sh.	o		41	11	2.29	0.55	† : sm	sh. : o	o
	44	12	2.25	0.52	sm.	sh. : sh	o		41	10½	2.35	0.55	sm.	sh.	o
7.1	41	11	2.24	0.58	†	sh.	o	7.6	42	11	2.70	0.54	†	sh.	o
	41	12	2.16	0.49	†	sh.	o		39	10½	2.45	0.51	†	sh. : †	o
	44	11½	2.57	0.53	sm.	o	o		42	11	2.64	0.53	sm.	o	o
	38	11	2.14	0.50	†	sh.	o		42	11½	2.66	0.55	sm.	o	o
7.2	38	11½	2.36	0.49	†	sh.	o	7.7	43	11	2.82	0.52	†	o	o
	41	11½	2.57	0.46	†	o	o		45	12	2.63	0.55	†	? sh.	o
	44	11	2.50	0.55	†	o	o		40	10½	2.92	0.53	†	o	o
	44	11	2.25	0.52	†	sh.	o		40	11	2.45	0.52	†	sh.	o
7.3	44	12	2.32	0.51	†	sh.	o	7.8	38	12	2.46	0.55	†	†	sm.
	44	12	2.25	0.46	†	sh.	o		38	11½	2.44	0.54	sm.	o	o
	44	11½	2.20	0.48	†	? sh. : †	o		43	12	2.56	0.55	†	sh.	o
	45	12	2.40	0.55	†	sh.	o		38	10½	2.52	0.48	sm.	sh.	o
7.4	38	11	2.17	0.47	†	o : sh.	o	7.9	42	11	2.49	0.54	† : sm	o	o
	40	10½	2.16	0.48	†	sh.	o		40	11	2.25	0.51	sm.	o : sh.	o
	41	11	2.66	0.54	†	† : sh.	tr.		40	11	2.39	0.54	†	†	sm : tr
	40	11	2.30	0.55	†	sh.	o		44	11½	2.60	0.56	†	sh.	o : tr.
7.5	39	11½	2.09	0.50	†	sh. : o	o	7.9	38	12	2.26	0.58	†	†	sm.
	39	10½	2.21	0.57	†	sh.	o		36	11½	2.26	0.53	†	sh.	o
	40	12	2.35	0.51	†	sh. : o	o		48	11	3.09	0.54	†	sh.	o
	41	10½	2.03	0.49	tr.	? sh.	o		39	11	2.51	0.50	†	o	o
7.6	43	11	2.26	0.48	tr : sm	o	o	7.9	39	10½	2.31	0.52	†	o	o
	37	13	2.19	0.52	†	sh.	o		42	10½	3.00	0.57	†	sh.	o
	39	11½	2.56	0.52	sm : †	sh.	o		41	10½	2.39	0.55	†	sh.	o
	37	10½	2.14	0.47	†	sh.	o		39	11	2.42	0.54	†	sh.	o
7.7	43	11	2.64	0.53	†	sh.	o	7.9	36	12	2.33	0.62	†	sh.	o
	41	11½	2.20	0.49	†	sh.	o		38	11	2.43	0.52	†	? sh.	o
	41	9½	2.17	0.48	tr.	o	o		38	12	2.24	0.56	†	†	sm.
	45	12	2.38	0.55	†	sh.	o		45	10½	2.59	0.52	sm.	sh.	o
7.8	37	11½	2.18	0.59	sm.	o : sh.	o								
	41	12	2.25	0.55	†	sh.	o								

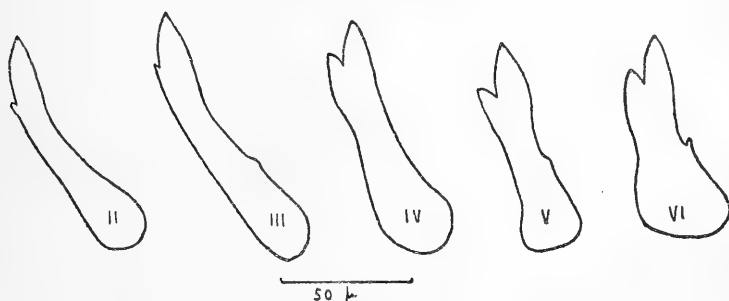
o=absent ; tr.=trace ; sm.=small ; sh.=shoulder ; †=well-developed.

The coefficient of variation of a linear dimension—diameter or altitude—of most snail shells is about 5, of their volume 12 or 15. It appears, therefore, that the number of rows and number of teeth in a row have about the same variability as the diameter of a shell. The length and area of the radulæ are apparently more variable. The

difficulties of accurate measurement, which have already been noticed, render this conclusion uncertain, though it hardly seems likely that errors of observation can have led to such a large difference. With regard to all the figures it must also be remembered that the shells from which the radulæ were derived were not all the same size but ranged either way from their mean by 6%, and that every item varies with the size of the shell.¹

The two teeth which obviously vary in their configuration are the third lateral and first marginal. With regard to the third lateral we may distinguish five types, shewn in the diagrammatic sketch, which occur with the following frequency:—

Type I.	Endocone absent, ectocone absent	...	...	0 = 0%
Type II.	Endocone small, ectocone absent	...	...	10 = 15%
Type III.	Endocone small, ectocone a shoulder	...	...	6 = 9%
Type IV.	Endocone present, ectocone absent	...	...	10 = 15%
Type V.	Endocone present, ectocone a shoulder	...	...	34 = 51%
Type VI.	Endocone present, ectocone present	...	...	6 = 9%



Type I. did not occur in the series. In the whole series the endocone was "small" in 24% of the specimens, the ectocone absent in 30%, represented by a shoulder in 60% and well developed in 9%. With regard to the first marginal, the endocone was present in seven cases, though always small or rudimentary, and in two on only one-half of the radula. It should also be noted that in six of these specimens, the third lateral had a definite ectocone; in the other the ectocone was represented by a shoulder only. This simultaneous progress in differentiation is a regular feature of the *Hyalinia* radula. Thus an ectocone on the third lateral is commonly associated with a well-developed endocone, and if the latter is very small the ectocone is often completely absent. The difference may sometimes be seen

1 The sort of difference which is introduced by this factor may be judged of by the average figures of half millimetre groups:—

Group	Mean diameter	Rows	Marginals	Long	Wide	Specimens
7.0—7.4	7.24	41.2	11.4	2.30	0.52	34
7.5—7.9	7.64	40.7	11.2	2.50	0.54	32
8.0—8.4	8.15	41.6	11.9	2.54	0.59	13

The correlation between total number of teeth and area of radula is only $+0.22 \pm 0.07$.

in the two halves of the same radula. It is apparent, therefore, that in specimens of *helvetica* of approximately the same size the third lateral tooth may be of various forms from an almost marginal to a complete lateral type; the drawings were all made from specimens between 7.3 and 7.7 mm. diam. in the present series.

TABLE II.

23 snails 8.0—8.8 mm. major diameter.

Diam'ter	Rows	M'rgia's	Long	Wide	Endocone 3rd lateral	Ectocone 3rd lateral	Endocone 1st marginal
8.0	41	11½	2.57	0.52	†	o	o
	39	13	2.35	0.62	sm.	sh.	o
	41	11	2.47	0.58	†	sh.	o
	40	11½	2.43	0.58	†	sh.	o
	45	12	2.37	0.61	†	sh.	o
8.2	39	13	2.44	0.59	†	sm.	tr.
	39	11	2.45	0.50	†	sh.	o
	45	13	2.99	0.68	†	tr.	o
	48	13½	2.92	0.66	†	sh. : †	o
	43	12	2.55	0.58	†	sh.	o
	41	10	2.56	0.61	†	sh.	o
8.3	41	11½	2.36	0.59	†	†	o
8.4	39	11½	2.55	0.57	sm. : †	o : sh.	o
8.5	41	11½	2.55	0.60	†	sh.	o
	42	12	2.91	0.58	†	sh.	o
	38	12	2.40	0.60	†	sh.	o
8.6	42	13	2.49	0.53	†	sh.	o
	41	12	2.60	0.61	†	tr.	tr.
	42	11½	2.50	0.52	†	sh.	o
	44	11	2.62	0.59	†	? sh.	o
	43	12½	2.60	0.63	†	sh.	o
8.7	44	11	2.77	0.65	†	sh.	o
8.8	44	12	3.14	0.67	†	tr.	o
Mean	8.34	41.83	11.91	2.600	0.647		

The 23 specimens of the 8.0 to 8.8 mm. series need not be dealt with at such length. The data are given in Table II. and show about the same range of variation as the longer series.

CONCLUSIONS.—The magnitude of spontaneous variation in the number of rows and number of teeth in a row in *Hy. helvetica* is of the same order as that of a linear dimension of a snail shell. The length and breadth of the radula are apparently more variable. There is also much variation in the configuration of the third lateral tooth. It is clearly necessary to examine radulæ from a series of specimens as well as from specimens of known size.

Jaminia cylindracea DaC. with two denticles.—While collecting this species among the heather which covers an outcrop of tertiary strata on Ridgeway Hill, Dorset, I took a specimen with a second denticle close beside the normal tooth. This does not seem to have been noticed in *J. cylindracea* though two and three toothed forms of *J. muscorum* are known. I should suggest that the name var. *bigranata* be adopted.—J. E. A. JOLLIFFE (*Read before the Society*, May 13th, 1914)."

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN & IRELAND.

433rd Meeting, held at the Museum, Manchester, June 10th, 1914.

Mr. E. Collier in the chair.

Additions to the Library announced and thanks voted:—

"Anatomie des Clausilies danoises : i.—Les organes génitaux," by C. M. Steinberg. "Catalog of Mollusca of South Carolina," by W. G. Mazyck. "A Review of South African Land Mollusca belonging to the Family Zonitidae—Part iii.," by Lt.-Col. H. H. Godwin-Austen. "On the Anatomy of *Conus tulipa* L., and *C. textile* L.," by H. O. N. Shaw. "Malacologiske notiser : i.—Nudibranchiater fra Bergens biologiske stations akvarier. ii.—Nogen mollusker fra Bergenskysten," by J. A. Grieg. "On a Collection of Non-Marine Mollusca from the Southern Sudân," by Jane Longstaff : "With Descriptions of Three New Species," by H. B. Preston ; and "Notes on *Veronicella nilotica*," by G. C. Robson (*from the respective authors*) ; and the usual periodicals received in exchange.

Donation to Cabinet announced and thanks voted:—

By Mr. J. Davy Dean : A large number of Voucher specimens, chiefly from the Cardiff district.

New Member Elected.

Herbert W. Worsfold, 28, Melody Road, Wandsworth, S.W.

Candidates Proposed for Membership.

W. G. Mazyck, Hon. Curator Charleston Museum, S. Carolina, U.S.A. (introduced by E. Collier and J. W. Jackson).

Rev. John McMurtrie, M.A., The Manse, Skene, Aberdeenshire (introduced by E. Collier and R. Standen).

Dr. W. G. N. van der Sleen, Eindenoutstraat 63, Haarlem, Holland (introduced by R. Standen and L. J. Shackleford).

Exhibits.

By Mr. J. Wilfrid Jackson : *Helicella virgata*, *H. itala*, *Hygromia hispida* and *H. rufescens* from Avebury Circle, Wilts ; *Helicella gigaxii* from North Berwick, Haddingtonshire (first record for Scotland) ; *Clausilia plicata* from Dornoch, E. Sutherland (doubtfully indigenous—no record of any introduction) ; *Cl. plicata* from Sweden and Budapest, for comparison ; a large series of Holocene shells from the Glastonbury Lake Village, including :—*Limnaea stagnalis*, *L. pereger*, *L. auricularia*, *L. palustris*, *Planorbis umbilicatus*, *Pl. vortex*, *Pl. contortus*, *Pl. fontanus*, *Pl. albus*, *Pl. crista*, *Physa fontinalis*, *Bithynia tentaculata*, *B. leachii*, *Valvata piscinalis*, *V. cristata*, *Acroloxus lacustris*, *Sphaerium corneum*, *Pisidium pulchellum*, and one land shell, viz. : *Vallonia excentrica*.

By Rev. L. J. Shackleford : *Marginella bifasciata* Lam. and *M. cleryi* Petit, in fine live condition from Goree.

By Mr. G. C. Spence : *Holospira goniostoma* Pfr. and *H. minima* v. Marts., from Sonora, Mexico ; *Helix aspersa*, a small form from sandhills, Rye, Sussex—the smallest measuring only 27 × 24 mm. ; and a small form of *H. virgata* from Lydd Marsh, Kent, showing considerable variation in markings.

In the Special Exhibit of the Genus *Neritina*, fine series of the British and foreign species were shown by Messrs. E. Collier, J. W. Jackson, and Mrs. Gill. The Manchester Museum collections were also exhibited.

434th Meeting, held at the Museum, Manchester, Sept. 9th, 1914.

Mr. E. Collier in the chair.

Additions to the Library announced and thanks voted :—

“Land and Freshwater Mollusca of the Valley of the Roe, Benevenagh, and Magilligan, co. Derry,” by A. W. Stelfox. “Manual of Conchology,” part 88, by H. A. Pilsbry (*from the respective authors*); and the usual periodicals received in exchange.

Donation to Cabinet announced and thanks voted :—

By Prof. A. E. Boycott : A dextral specimen of *Clausilia bidentata*, taken by him at Portmadoc, North Wales, August, 1914.

New Members Elected.

Dr. W. G. N. van der Sleen.

W. G. Mazyck.

Rev. John McMurtrie.

Candidates Proposed for Membership.

John Noble Kennedy, R.N., H.M.S. “Antrim,” c/o G.P.O., London (introduced by J. R. le B. Tomlin and Kenneth H. Jones).

Alfred John Saban, 318, Ivydale Road, Peckham Rye, S.E. (introduced by Capt. W. J. Farrer and J. Ray Hardy).

Death.

A. J. Jukes Browne, F.R.S., F.G.S.

Papers Read.

“Note on *Bursa (Tutufa) rubeta* (Bolten) = *Triton lampas* (Lam. et auct.),” by Edgar A. Smith, I.S.O.

“Notes on Fluvatile Mollusca from Port Patrick, Wigtownshire,” by John N. Kennedy, R.N.

“Molluscan Rubber Pests,” by G. C. Robson, B.A.

“The Marine Mollusca of São Thomé,” I., by J. R. le B. Tomlin, M.A., and Lewis J. Shackelford.

Exhibits.

By Mr. G. C. Spence : Nine species of Formosan and Japanese *Pupinella*, and *Pupinella angasi* Brazier, Louisiade Islands.

By Mr. C. H. Moore : *Helix hortensis*, *Hygromia rufescens*, and other species from Ilfracombe; *Helicisoma lapicida*, *Hygromia hispida*, *Clausilia bidentata*, *Jaminia cylindracea*, and *Hyalinia alliaria*, from Lynmouth; and varieties of *Helicella virgata* from Croyd Bay, North Devon.

By Mrs. Gill : A drawer of *Placostylus*, showing variation in form, and some of the rarer species.

By Mr. J. Wilfrid Jackson : Elongate specimens of *Azeca* from Clapham, Yorks. (coll. J.W.J.), and Barnoldswick, Yorks. (coll. H. Beeston), for comparison with *Azeca elongata* described by Mr. J. W. Taylor in the “Naturalist,” March, 1897, p. 75.

It was decided to have the following **Special Exhibits** at future meetings :

October 14th - *Planorbis spirorbis* and *P. vortex*.

November 11th - The Genus *Alycaeus*.

December 9th - The Genus *Ranella*.

THE MARINE MOLLUSCA OF SÃO THOMÉ, I.

BY J. R. LE B. TOMLIN, M.A., AND L. J. SHACKLEFORD.

(Read before the Society, Sept. 9th, 1914).

THE material from which the following list has been compiled was collected in S. Thomé by Mr. J. Chalmers. He was unfortunately unable, for various reasons, to do any dredging, and we gather that the heavy surf would make dredging a very difficult operation in a small boat. The list is, therefore, exclusively a record of shore collecting. Mr. Chalmers also sent home large quantities of coarse coral gravel from which all the small shells were sifted, but a very large proportion of specimens from this source was too rolled and worn for identification, otherwise our list would be considerably larger. Even as it is we are able to make a considerable addition to the authentic records from this island.

The only list that has been published, so far as we are aware, is Nobre's "*Sur la Faune Malacologique de S. Thomé*," subsequently incorporated (M. Nobre informs us) in his "*Matériaux pour l'étude de la Faune Malacologique des Possessions Portugaises de l'Afrique Occidentale*" (1909), published in the *Bulletin de la Société Portugaise des Sciences Naturelles*, tome iii., suppl. 2. In this paper 126 species are recorded for S. Thomé, 57 of which have not occurred in our material. The ensuing list records 188, making a total of 245 for the island.

There are, however, probably a few misidentifications in M. Nobre's list, which would slightly reduce this total. We record below 31 species which are common to the West Indies, as compared with 15 in Dautzenberg's "*Contributions à la Faune Malac. de l'Afrique Occidentale*" in *Actes de la Société Linn. de Bordeaux*, 1910—a paper in which the author ascribes the presence of West Indian species on the West African coast to the branch of the Gulf Stream, known as the Canaries current, which crosses the Atlantic from the Gulf of Mexico to Portugal, and then runs southwards along the African coast. We do not, however, recollect reading of the occurrence of any West Indian shells on the Portuguese coast.

The marine mollusca of S. Thomé obviously have a very close affinity with those of the Cape Verdes, but though so much further south—S. Thomé lies practically on the equator—the tropical element seems much smaller than in the Cape Verdes. Apart from a few species of very wide distribution, the Cape element is almost absent.

Our thanks are due to Mr. T. Iredale, M. Augusto Nobre, M. Ph. Dautzenberg, and the Marchese di Monterosato for much kindly help.

Melampus flavus (Gmel.).

Voluta flava Gmelin, Syst. Nat., ed. xiii., p. 3436.

S. Thomé, common; Principe and Cape Verdes (Nobre); West Indies.

Melampus pusillus (Gmel.).

Voluta pusilla Gmel., Syst. Nat., ed. xiii., p. 3436.

S. Thomé, fairly common; Principe and Cape Verdes (Nobre); West Indies.

Pedipes afer (Gmel.).

Helix afra Gmel., Syst. Nat., ed. xiii., p. 3651.

H. and A. Adams, Genera of Recent Moll., II., p. 248, pl. lxxxiii., f. 4.

S. Thomé, fairly common; Cape Verdes (Bouvier); Azores and S. Helena (Smith); Madeira, very common (Watson); Cansado, Plage de Hann, Boulbiné and Mossamedes (Dautzenberg); Lisbon and Salvages (Wollaston, Test. Atl., pp. 50, 265, 293).

Siphonaria algesirae Quoy et Gaimard.

Quoy et Gaimard, Voyage de l' "Astrolabe," II., p. 338, pl. xxv., f. 23—25.

S. Thomé, scarce; Canaries (Watson); Cape Verdes, abundant (Nobre); Atlantic, from Portugal to Mossamedes; Mediterranean.

Gadinia garnoti (Payr.).

Pileopsis garnoti Payraudeau, Moll. Corse, p. 94, pl. 5, f. 3, 4.

S. Thomé, scarce; Mediterranean.

Gadinia costata (Krauss).

Mouretia costata Krauss, Sudafr. Moll., p. 57, pl. 4, f. 1.

S. Thomé, scarce; Cape Verdes (Nobre); S. Africa; S. Helena (Smith).

Williamia gussoni (Costa).

Ancylus gussonii Costa, Cat. Test. Sicil., pp. 120, 125.

S. Thomé, common; Canaries (McAndrew); Azores, S. Helena and Ascension (Smith).

We should be disinclined to include ¹*Patella radiata* Pease in the synonymy without anatomical confirmation.

Actæon maltzani Dautzenberg.

Dautzenberg, Contrib. Faune Afr. Occ., I., p. 10, pl. 1, f. 1, 2.

Actæon senegalensis von Maltzan (non Petit).

S. Thomé, rare; Goree (von Maltzan); Rufisque and Libreville (Dautzenberg).

Retusa striatula (Fbs.).

Bulla striatula Forbes, Rep. Aegean Invert. (Brit. Assoc., 1843), p. 188.

S. Thomé, scarce; Mediterranean.

Tornatina knockeri Smith.

Smith, P.Z.S., 1871, p. 738, pl. lxxv., f. 30.

S. Thomé, common ; Whydah (Smith) ; Cansado, Rufisque, W. of Cape Rouge, Conakry, Boulbiné, Los Is., Cotonou, Libreville, Banana, Shart Point, and Mossamedes (Dautzenberg).

Weinkauffia diaphana (Aradas).

Bulla diaphana Aradas, Cat. Conch. Sicil., p. 40.

Scaphander gibbulus Jeffr., Ann. and Mag. Nat. Hist., 2nd ser., xvii., p. 188, pt. II., f. 20, 21.

Atys diaphana Arad., Pilsb., Man. of Conch., xv., p. 278, pl. xxxii., f. 29, 30.

S. Thomé, Rufisque, W. of Cape Rouge, Conakry, and Los Is. (Dautzenberg) ; Madeira (Watson) ; Mediterranean.

Cylichna cylindracea (Pennant).

Bulla cylindracea Pennant, Brit. Zool., iv., p. 117, pl. 70, f. 85.

S. Thomé, fairly common ; Norway to Madeira, Canaries, and Azores ; Whydah (Smith) ; S. Helena (Smith) ; Port Elizabeth (Sowerby) ; Ascension, 420f., and Tristan da Cunha (Challenger) ; Gulf of Oman, Maskat, and Bombay (Melvill).

Bulla adansonii Philippi.

Bulla adansonii Philippi, Zeitschr. f. Malak., 1847, p. 121.

Pilsbry, Man. Conch., xv., p. 333, pl. xxxviii., f. 61.

S. Thomé, common ; Cape Verdes ; Cape Blanco to Loanda.

It is curious that *B. ampulla* L., which Nobre reports as "très commun" at S. Thomé, did not occur in our consignments.

Haminea orbignyana (Férussac).

Bulla orbignyana Férussac, Dict. Classique d'Hist. Nat., II., p. 573.

Dautzenberg, Contrib. Faune Afr. Occ. I., p. 13, pl. 1, f. 3, 4.

S. Thomé, not uncommon ; Senegal (Dautzenberg) ; Brittany and Gulf of Gascony ; Mediterranean.

This is probably Nobre's ¹*Haminea* sp. ? from S. Thomé.

Ringicula suturalis Smith.

Smith, P.Z.S., 1871, p. 733, pl. lxxv., f. 12.

S. Thomé, common ; Whydah (Smith).

Terebra corrugata Lam.

Lamarck, Anim. Sans Vert., x., p. 244.

S. Thomé, a few worn specimens ; Cape Verdes, plentiful (Chalmers) ; Loanda.

Conus papilionaceus Hwass.

Hwass, in Bruguière, Encycl. Méthod., I., 2nd part, p. 665.

Reeve, Conch. Icon., pl. xxxiv., p. 188.

S. Thomé, fairly common; Senegal to Gaboon (Dautzenberg); Canaries (d'Orbigny); Cape Verdes and Principe (Nobre); Angola (Welwitsch).

Fossil: Ghenoudert, Marsa, El Biferchi, Timardine, Tafouelli, and Nouaremech in Senegal (G. F. Dollfus).

Conus testudinarius Martini.

Martini, Conch. Cab., II., p. 250, pl. 55, f. 605.

S. Thomé, common; Principe (Nobre); Cape Verdes; W. coast of Africa; Benguela (Nobre); S. Helena (Smith); West Indies (Tryon).

Clavatula muricata (Lam.):

Pleurotoma muricata Lam., Anim. Sans Vert., vii., p. 91.

S. Thomé, rare; Conakry, Los Is., Libreville (Dautzenberg); Gaboon and Guinea coasts.

Surcula sinistralis (Petit).

Pleurotoma sinistralis Petit de la Saussaye in Guérin, Mag. de Zool., 1839, pl. 1.

S. Thomé, not uncommon; Senegal to the Equator (Dautzenberg).

Mangilia merlini Dautzenberg.

Dautzenberg, Contrib. Faune Afr. Occ., I., p. 27, pt. 1, f. 8—10.

S. Thomé, fairly common; Cansado, Rufisque, W. of Cape Rouge (Dautzenberg).

Mangilia mediofasciata von Maltzan.

Mangilia (Raphitoma) nebula var. *mediofasciata* von Maltzan, Seneg.

Pleurot. in Jahrb. d. d. Malak. Ges., X., p. 132, pl. iii., f. 12.

S. Thomé, very common; Goree (von Maltzan); Rufisque, W. of Cape Rouge, Libreville, and Congo estuary (Dautzenberg).

Clathromangelia granum (Phil.).

Pleurotoma granum Philippi, Enum. Moll. Sic., ii., p. 170.

? *Clathurella clathrata* M. de Serres, Geogn. du Midi, p. 113, t. 2, f. 7, 8.

S. Thomé, rare; Mediterranean; West Africa.

Monterosato denies its identity with the fossil *clathrata* M. de Serres.

Clathurella laviaë (Phil.).

Pleurotoma laviaë Philippi, Enum. Moll. Sic., ii., p. 170, pl. 26, f. 17.

S. Thomé, not common; Mediterranean.

Clathurella linearis (Mont.).

Murex linearis Montagu, Test. Brit., p. 261, pl. ix., f. 4; Suppl. (1808), p. 115.

S. Thomé, not uncommon; Goree (von Maltzan); Rufisque (Dautzenberg); Canaries (McAndrew); Madeira, abundant (Watson); Iceland and Norway to Mediterranean.

Cancellaria cancellata (L.).

Voluta cancellata Linné, Syst. Nat., Ed. xii., p. 1191.

S. Thomé; Rufisque, W. of Cape Rouge, Loanda (Dautzenberg); Mediterranean.

var. **similis** Sow.

Cancellaria similis Sowerby, Conch. Illustr., no. 9, f. 38.

S. Thomé; Senegal to Mossamedes (Dautzenberg); Cape Verdes.

Both forms occur in the Mediterranean, the type form being commoner there as it is also in Senegal. The variety becomes preponderant further south.

Oliva flammulata Lam.

Lamarck, Ann. du Mus. Paris, xvi., p. 314.

S. Thomé, common; Cape Verdes; Principe (Nobre); Cape Blanco to Loanda; Antilles (Römer).

var. **pallida** Dautz. also occurs at S. Thomé.

Oliva acuminata Lam.

Lamarck, Anim. Sans Vert., vii., p. 434.

S. Thomé, common; Rio de Oro (Font); Senegal (Dautzenberg); Whydah (Smith); Cape Verdes (Rochebrune); Principe (Nobre); Angola (Welwitsch).

Fossil: Marsa in Senegal (G. F. Dollfus).

Nobre describes an entirely white variety from S. Thomé and Angola as var. *pallida*.

Olivella pulchella (Duclos).

Oliva pulchella Duclos, Monogr. G. *Oliva*, pt. v., f. 11, 12.

? *Oliva leucozonias* Gray, Zool. Voy. Beechey, p. 130, pl. 16, f. 16, 17.

S. Thomé, common; Senegal (Dautzenberg); Cape Verdes (Bouvier).

Mr. J. M. Williams, who has made a special study of this genus, denies the identity of *O. pulchella* and *O. leucozonias*. He says (in litt.) that *O. pulchella* is uniformly larger and broader, bandless, plain yellow within, and has an arched columella, whereas *O. leucozonias* has three white bands, a line of brown spots within the margin of the lip, and a fairly straight columella.

Harpa rosea Lam.

Lamarck, Hist. Nat., x., p. 133.

S. Thomé, common ; Principe and Cape Verdes (Nobre) ; Guinea ; Senegal.

Marginella triticea (Lam.).

Volvaria triticea Lamarck, Anim. Sans Vert., vii., p. 363.

S. Thomé, common ; Cansado and Pointe du Repos (Dautzenberg) ; Senegal.

var. **alba** nov., of a pure porcellanous white, is also not uncommon.

Marginella eveleighi Tomlin and Shackleford.

Tomlin and Shackleford, *Journ. of Conch.*, vol. 14, p. 11, pl. 1, f. 5, 6.

S. Thomé, rare.

Marginella liparozona Tomlin and Shackleford.

Tomlin and Shackleford, *Journ. of Conch.*, vol. 14, p. 43.

M. festiva Reeve (*nec* Kiener).

S. Thomé, rare. Usually quoted from E. Africa, but this is probably an error.

Marginella festiva Kien.

Kiener, Coq. Viv., p. 32, pl. 10, f. 4.

S. Thomé, rare ; East Africa ?

Marginella dautzenbergi Tomlin and Shackleford.

Tomlin and Shackleford, *Journ. of Conch.*, vol. xiii., p. 319, pl. 4, f. 1, 2.

S. Thomé, common.

Marginella philippii Monts.

Monterosato, Enum. e Sin., p. 49.

M. minuta Phil. (*nec* Pfeiffer).

S. Thomé, scarce ; Madeira (Nobre) ; Canaries ; Mediterranean.

Marginella chudeau Bayav.

Bayav in Dautzenberg, Contrib. Faune Afr. Occ., I., p. 41, pl. 2, f. II.

S. Thomé, rare ; Port Etienne, Cansado, P. de Repos, Rufisque, W. of Cape Rouge, and Mossamedes (Dautzenberg).

The S. Thomé examples belong to the var. *trivittata* (l.c.).

Marginella melvilli Tomlin and Shackleford.

Tomlin and Shackleford, *Journ. of Conch.*, vol. 14, p. 11, pl. 1, f. 1, 2.

S. Thomé, very rare.

Marginella chalmersi Tomlin and Shackleford.

Tomlin and Shackleford, *Journ. of Conch.*, vol. xiii., p. 320, pl. 4, f. 3, 4.

S. Thomé, not uncommon, but local.

Marginella clandestina Brocchi.

Brocchi, Conch. Foss. Subap., ii., p. 242, pl. xv., f. 11.

S. Thomé, fairly common; Canaries (Watson); Baie de Cansado, Arguin Is., El Frey and El Mamghar (Dautzenberg); Portugal; Mediterranean.

Mitra adansoni Phil.

Philippi, Zeit. f. Mal., 1848, p. 155.

S. Thomé, rare; Gaboon (Philippi).

There has been some confusion between the name of this species and the oriental *adamsoni* Gray. Our specimens agree exactly with the original description and with a specimen in the British Museum labelled *adansoni*. It is quite distinct from *M. fusca* Sow. with which Tryon is inclined to unite it.

Mitra (Thala) foveata Sow.

Mitra foveata Sowerby, Thesaurus, no. 213, f. 408.

S. Thomé, several examples; West Indies.

Mitrolumna olivoidea (Cantr).

Mitra olivoidea Cantraine, Bull. Acad. Brux., 1835, p. 391.

S. Thomé, common; Canaries; Mediterranean.

The var. **crenipicta** Dautz. is also common at S. Thomé.

Fusus bættgeri von Maltzan.

von Maltzan, Diagn. Neuer Seneg. Gastrop. in Nachrichtsblatt d.d. Malak. Ges., 1884, p. 67.

S. Thomé; Goree (von Maltzan); Baies de Hann et de Rufisque (Dautzenberg).

Our single specimen is identical with that figured by Dautzenberg, who justly censures the inadequacy of the original description and the absence of a figure.

Latirus filusus Sch. and Wag.

Schubert and Wagner, Conch., xii., 349, xiii., 49, t. 15, 16.

S. Thomé, rare; Prince's Island and Senegal (Tryon); Cape Verdes, fossil (Nobre).

Semifusus morio (L.).

Murex morio Linné, Syst. Nat., ed. x., p. 753.

Tryon, Man. Conch., iii., p. 111, pl. xliii., f. 228, 229.

S. Thomé; Principe (Rattray); Cape Verdes (Nobre); Arguin Is. to Loanda (Dautzenberg).

Fossil: Ghenoudert, El Biferchi, Timardine, N'Tibbau, and Tafou elli in Senegal (G. F. Dollfus).

Polia d'orbignyi (Payr.).

Buccinum d'orbignyi Payraudeau, Moll. Corse, p. 159, pl. 8, f. 4.

S. Thomé, rare ; Senegal (Reeve) ; Mediterranean.

Polia viverrata (Kiener).

Buccinum viverratum Kiener, Icon. Coq. Viv., p. 35, pl. x, f. 35.

S. Thomé, common ; Spanish Guinea (Hidalgo) ; Gaboon (Le Chatelier) ; Bilaouak, Bernard, Baie de Hann, Los Is., Conakry, and Libreville (Dautzenberg) ; Principe, Cape Verdes and Mossamedes (Nobre).

For the generic name *Polia*, instead of *Tritonidea*, see Iredale in Proc. Malac. Soc., x., p. 221.

Columbella rustica (L.).

Voluta rustica Linné, Syst. Nat., ed. x., p. 731.

var. **striata** Duclos.

Columbella striata Duclos, Ill. Conch., pl. vi., f. 5—8, and pl. xiii., f. 19, 20.

S. Thomé, common ; Principe ; Canaries ; Cape Verdes ; Morocco to Loanda (Dautzenberg).

This form is distinguished from the type by its strong spiral furrows. Probably var. *azorica* Drouet is the same.

var. **rosacea** Nobre.

"Shell smaller and of a uniform rose colour." Common. We have it also from Annobon Is.

Columbella parvula (Dunker).

Buccinum parvulum Dunker, Zeitschr. f. Malac., 1847, p. 64.

Philippi Abbildungen, p. 65, pl. ii., f. 7.

Dautzenberg, Contrib. Faune Afr. Occid., I., p. 60.

S. Thomé, rare ; Dakar (Chautard) ; Cansado, W. of Cape Rouge, Conakry, Boulbiné, Los Is., and Libreville (Dautzenberg) ; West Indies (Philippi).

We are indebted to M. Dautzenberg for the name of this shell. He says (l.c.) : "Cette espèce a été reliée à tort au *C. cribraria* par Tryon ; elle est beaucoup plus petite et son dessin est fort différent."

Murex rosarium Chem.

Chemnitz, Conch. Cab., x., t. 161, f. 1528, 9.

S. Thomé, common ; Fernando Po ; Cape Verdes and Bissau, Guinea (Nobre).

Pseudomurex meyendorffi (Calcara).

Murex meyendorffi Calcara, Cenzo Moll. Sicil., p. 33, pl. iv., f. 22.

S. Thomé, not uncommon; Madeira, abundant (Watson); Mediterranean; Spanish Guinea (Hidalgo); Port Elizabeth (Crawford).

Donovania minima (Mont.).

Buccinum minimum Montagu, Test. Brit., p. 247, pl. viii., f. 2; suppl. (1808) p. 109.

S. Thomé, scarce; Madeira, very common, and Canaries (Watson); Atlantic from Great Britain to Senegal; Mediterranean.

Donovania affinis Monts.

Monterosato, Coq. Mar. Maroc. in *Journ. de Conch.*, xxxvii., p. 116.

Dautzenberg, Contrib. Faune Afr. Occ., I., p. 66, pl. ii., f. 11, 12.

S. Thomé, plentiful; Bel Air and W. of Cape Rouge (Dautzenberg); Casablanca, Taormina, and Pantellaria (Monterosato).

Purpura haemastoma (L.).

Buccinum haemastomum Linné, Syst. Nat., ed. xii., p. 1202.

Tryon, Man. Conch., ii., p. 167, pl. xlix., f. 80, pl. l., f. 87.

S. Thomé, common; Principe (Nobre); Madeira, Cape Verdes, Canaries, and Azores; Atlantic, from the Gulf of Gascony to Mossamedes; Mediterranean.

Purpura nodosa (L.).

Nerita nodosa Linné, Syst. Nat., ed. x., p. 777.

Murex neritoideus Linné, Syst. Nat., ed. xii., p. 1219.

S. Thomé, rare, and only small specimens; Principe (Nobre); Cape Verdes; Guinea; Benguela (Dunker).

Sistrum nodulosum (C. B. Adams).

Purpura nodulosa C. B. Adams, Bost. Proc., 1845, ii., 2.

Tryon, Man. Conch., ii., p. 190, pl. 59, f. 275.

S. Thomé, fairly common; Principe, Cape Verdes, and Fernando Po (Nobre); Spanish Guinea (Hidalgo); West Indies; Brazil.

Cypræa zonata Chem.

Chemnitz, Conch. Cab., x., p. 107, pl. cxliv., f. 1342.

S. Thomé, rather common; Senegal, Guinea (Dautzenberg); Cape Verdes and Angola (Nobre).

Cypræa stercoraria L.

Linné, Syst. Nat., ed. x., p. 719.

Sowerby, Thes., pl. xvi., f. 96—98.

S. Thomé, not common; Cape Verdes (Nobre); Spanish Guinea (Hidalgo); Senegal to Mossamedes.

Cypræa lurida L.

Linné, Syst. Nat., ed. x., p. 720.

S. Thomé, common; Ascension, Azores, Canaries, and S. Helena (Smith); Cape Verdes, common (Bouvier); Angola (Welwitsch); Gaboon (Le Chatelier); Annobon (Dunker); Mediterranean.

The S. Thomé examples are invariably small and very dark in colour.

Cypræa spurca L.

Linné, Syst. Nat., ed. xii., p. 1179.

S. Thomé, fairly common; Angola (Nobre); Annobon (Dunker); Canaries (d'Orbigny, McAndrew); Azores, Ascension, and S. Helena (Smith); St. Vincent, C.V.; Mediterranean; West Indies; Pernambuco (Dall).

Trivia candidula Gaskoin.

Gaskoin, P.Z.S., 1835, p. 200.

Tryon, Man. Conch., vii., p. 203, pl. xxii., f. 33, 34.

S. Thomé, not common; Cape Verdes, Canaries, and Madeira; Portugal to Mediterranean and Senegal; S. Helena (Smith); Mexico (Roberts in Tryon).

Erato prayensis Roch.

Rochebrune, Bull. Soc. Philom., 1881, vol. vi., p. 30; id., Nouv. Archiv.

Mus., 1881, vol. iv., p. 294, pl. 17, f. 16a, b.

Smith, Proc. Malac. Soc., vol. ix., p. 14.

S. Thomé, abundant; Porto Praya, C.V.

Compared with *E. maugerae* Gray, this species seems to be more finely and numerously denticled within the outer lip.

Cymatium costatum (Born).

Murex costatus Born, Mus. Caes. Vindob., p. 297.

S. Thomé, a few immature specimens; Madeira; Cape Verdes; S. Helena; Mediterranean to the Cape; West Indies; Indian and Pacific Oceans.

For the distribution in greater detail cf. Lischke Jap. Meeres Conch., pt. i., p. 48.

Bursa pustulosa (Rve.).

Ranella pustulosa Reeve, P.Z.S., 1844, p. 137; id., Conch. Icon., pl. 3, f. 11a, b.

S. Thomé, common; Cape Verdes (Rattray and Bouvier); S. Helena and Ascension (Smith); near Banana (Dautzenberg). Smith unites this species with *caelata* Brod. from Panama.

Distorsio ridens (Rve.).

Triton ridens Reeve, P.Z.S., 1844, p. 115.

Triton ridens id., Conch. Icon., pl. xii., f. 46.

S. Thomé, three specimens, all rather worn; Banana, Senegal, Cape Verdes, Antilles, Costa Rica (Dautzenberg).

Colubraria testacea (Mörch).

Triton testaceus Mörch, Yoldi Cat. 107; Malak. Blätt., xxiv., p. 25.

S. Thomé, a single specimen; West Indies.

Cassis spinosa Gron.

Gronovius, Zoophyl., iii., p. 302, pl. 19, f. 9.

S. Thomé, fine examples; Gaboon estuary (Dautzenberg); Principe, Loanda, and Lobito (Nobre).

Cassis testiculus L.

Linné, Syst. Nat., ed. xii., p. 1199.

S. Thomé; Cape Verdes, common; Portuguese Guinea, Principe, and Angola (Nobre); S. Africa (Bairstow coll.); W. Indies.

Amphiperas hordacea (Lam.).

Ovula hordacea Lamarck, Ann. du Mus. Paris, xvi., p. 112.

S. Thomé, rare.

Dolium galea (L.).

Buccinum galea Linné, Syst. Nat., ed. xii., p. 1197.

S. Thomé, plentiful; S. Vincent, C.V.; Canaries (McAndrew); Madeira (Watson); Portugal to Mediterranean (Watson); Beaufort, N.C., to West Indies (Tryon); Santos, Brazil (J. D. Dean).

Strombus bubonius Lam.

Lamarck, Anim. Sans Vert., vii., p. 203.

S. Thomé, rather common; Principe (Ratray); Spanish Guinea (Hidalgo); Cape Verdes (Nobre); Baie de Hann, Rufisque, W. of Cape Rouge, and Gaboon (Dautzenberg).

Triphora perversa (L.).

Trochus perversus Linné, Syst. Nat., ed. x., p. 760.

Bucquoy, Dautzenberg et Dollfus, Moll. du Roussillon i., p. 209, pl. xxvi., f. 8—17.

S. Thomé, common; Canaries, Azores, and Cape Verdes; Atlantic from Norway to Morocco; Mediterranean; Senegal; S. Helena (Smith); South Africa (Sowerby).

Specimens also occurred, not uncommonly, which are apparently referable to var. *obesula* Monts. and var. *lactea* Monts.

Triphora arthuri (Jouss.).

Jousseume, Bull. Soc. Mal. France, 1884, p. 221.

T. variegatus A. Ads., P.Z.S., 1851, p. 277 (name preoccupied).

S. Thomé, rare; West Indies.

Cerithium guinaicum Phil.

Philippi, Abbild., p. 17, pl. 1, f. 13.

S. Thomé, common; Cape Verdes (Nobre); Tamara and Libre-ville (Dautzenberg).

Cerithium atratum Born.

Born, Test. Mus. Caes. Vindob., p. 324, pl. 11, f. 17, 18.

S. Thomé, rare; Cape Verdes (Nobre); Baie du Lévrier to Loanda (Dautzenberg); West Indies.

Potamides radula (L.).

Murex radula Linné, Syst. Nat., ed. x., p. 756.

S. Thomé, common; Spanish Guinea (Hidalgo); Senegal to Mossamedes.

Fossil: Tinnamaten, Teniejemara, Nouakchott in Senegal (G. F. Dollfus).

Cerithiopsis tubercularis (Montagu).

Murex tubercularis Montagu, Test. Brit., p. 270, and suppl., p. 116.

Bucquoy, Dautzenberg et Dollfus, Moll. du Roussillon, i., p. 204, pl. xxvii., f. 1—4.

S. Thomé, not common; Cansado (Dautzenberg); Rio de Oro (Font); Tenerife and Cape Verdes (Prince de Monaco); Madeira, not uncommon (Watson); Norway to Mediterranean; Port Elizabeth (Sowerby).

Cerithiopsis minima (Brus.).

Cerithium minimum Brusina, Conch. Dal., p. 17.

S. Thomé, rather common; Madeira (Watson); Mediterranean.

Cerithiopsis bilineata (Hoernes).

Cerithium bilineatum Hoernes, Tert. Wien, i., p. 416, pt. 42, f. 22.

S. Thomé, rare; Mediterranean.

Cerithiopsis concatenata (Conti).

Cerithium concatenatum Conti, Foss. di M. Mario (1864), pp. 32, 51.

S. Thomé, rare; Madeira (Watson); Great Britain to Mediterranean.

Modulus ambiguus Dautz.

Dautzenberg, Contrib. Faune Afr. Occ., I., p. 73, pl. ii., f. 13, 14.

S. Thomé, rare; Bilaouak (Dautzenberg).

Vermetus adansonii Daudin.

Daudin, Recueil de Mémoires et Notes, p. 35.

Tryon, Man. of Conch., viii., p. 169, pl. xlix., f. 20, 21 ; pl. xlviii., f. 12.

S. Thomé, rare ; Senegal, Gaboon (Dautzenberg).

Sub-fossil : Nouakchott (Dautzenberg).

Siliquaria senegalensis Récluz.

Récluz in Mörch, P.Z.S., 1860, p. 408.

Reeve, Conch. Icon., *Siliquaria*, f. 8.

S. Thomé, rare ; Spanish Guinea (Hidalgo) ; Senegal ; Cape Verdes (Nobre).

Mathilda quadricarinata (Brocchi).

Turbo quadricarinatus Brocchi, Conch. Foss. Subap., p. 375, pl. vii., f. 6.

S. Thomé, rare ; S. Helena and Canaries (Smith) ; Madeira (Watson) ; Rufisque (Dautzenberg) ; Mediterranean.

Caecum vicinum de Folin.

de Folin, Les Fonds de la Mer, i., p. 207, pl. xxviii., f. 5, 6.

S. Thomé, rare ; Baie du Lévrier (de Folin) ; Conakry and W. of Cape Rouge (Dautzenberg).

Planaxis herrmannseni Dkr.

Dunker, Index Moll. Guin., p. 16, pl. ii., f. 33, 34.

S. Thomé, common ; Cape Verdes ; Tamara (Dautzenberg) ; Benguela (Dunker).

Sometimes ranked as a variety of *P. lineatus* daC.

Littorina punctata (Gmel.).

Turbo punctatus Gmelin, Syst. Nat., ed. xiii., p. 3597.

S. Thomé, not common ; Mediterranean to Cape Colony ; Madeira and Cape Verdes (Nobre).

Littorina cingulifera Dkr.

Dunker, Zeitschr. f. Malak., 1845, p. 166.

S. Thomé, a few specimens ; Conakry, Port Bouet, Libreville, Banana, Benguela, and Loanda (Dautzenberg).

Tectarius granosus (Phil.).

Littorina granosa Philippi, Abbild., p. 65, pl. vii., f. 14.

S. Thomé, not uncommon ; Conakry (Rattray) ; Boulbiné, Los Is., Tamara, Ivory Coast, Libreville (Dautzenberg) ; Liberia, Gaboon, and Fernando Po are also quoted by Dautzenberg.¹

¹ Miss. Gruvel in Ann. de l'Inst. Océanogr., Moll. Marins, p. 47 (sep. copy).

Fossarus ambiguus (L.).

Helix ambigua Linné, Syst. Nat., ed. xii., p. 1251.

S. Thomé, not uncommon; Boulbiné, Mossamedes, Praya Amelia (Dautzenberg); S. Helena (Smith); Canaries, Cape Verdes, and Azores (Smith); Mediterranean to Mogador (McAndrew).

Fossarus (Phasianema) sulcosus (Brocchi).

Nerita sulcosa Brocchi, Conch. Foss. Subap., ii., p. 298, pl. 1, f. 3.

S. Thomé, two living specimens embedded in mud on *Spondylus* valves; Cansado and Pointe du Repos (Dautzenberg).

Originally described as a Miocene and Pliocene fossil.

One of our examples measures 15 mm. by 11 mm.

Architectonica architae (Costa).

O. G. Costa, Cat. Test. Viv. nel Golfo di Taranto in Atti dell' Acc. delle Scienze, vol. iii., p. 40, n. 15 (1830).

S. Thomé, rare; Taranto, Naples, and Palermo (Monterosato); Malaga (McAndrew); Tripoli and Tunis; S. Helena (Smith).

Architectonica nobilis Bolten.

Bolten, Mus. Bolt., p. 78 (based on Chem., vol. 5, pl. 1695-6).

S. Thomé, scarce; St. Vincent, C.V.; West Indies.

Torinia malani Dautzenberg.

Dautzenberg, Contrib. Faune Afr. Occ., I., p. 80, pl. ii., f. 15—17.

S. Thomé, one specimen; Rufisque (Dautzenberg).

Pseudomalaxis macandrewi Iredale.

Iredale, Proc. Malac. Soc., vol. ix., p. 254.

S. Thomé, rare; Madeira, very common (Watson); Los Is. (Dautzenberg); Mediterranean.

Iredale (loc. cit.) has satisfactorily worked out the nomenclature of this species, and has established its distinctness from *Bifrontia zancae* Phil., a point asserted by Monterosato in Conch. d. Prof. Palermo, p. 16.

Alaba culliereti (Dautzenberg).

Pseudobittium culliereti Dautzenberg, Mem. Soc. Zool. de France, p. 20, pl. ii., f. 2a—c.

S. Thomé, common on the shore, dead; Senegal, between Dakar and Goree at a depth of fifteen metres (Chevreux).

In ¹Contrib. Faune Malac. Afr. Occ. I., p. 81, Dautzenberg sinks his genus *Pseudobittium*, established for this species, as a synonym of *Alaba*.

Rissoia similis (Scacchi).*Rissoa similis* Scacchi, Cat. Reg. Nap., p. 14.

S. Thomé, scarce; Madeira and Selvagens, very abundant (Watson); Mediterranean.

Alvania cancellata (Da Costa).*Turbo cancellatus* Da Costa, Brit. Conch., p. 104, pl. 8, f. 6, 9.

S. Thomé, not uncommon; Bay of Praya-Amelia (Dautzenberg); Canaries, Azores, Madeira; Atlantic from Great Britain to Morocco; Mediterranean.

Alvania crispa Watson.

Watson, P.Z.S., 1873, p. 369, pl. 34, f. 6.

S. Thomé, rare; Madeira, abundant (Watson).

Rissoina elegantula Angas.

Angas, P.Z.S., 1880, p. 417, pl. 40, f. 10.

S. Thomé, not uncommon; Port Elizabeth and Port Alfred; South Australia.

Barleeia rubra (Mont.).*Turbo ruber* Montagu, Test. Brit., p. 320.

S. Thomé, abundant; Teneriffe (McAndrew); Great Britain to Mediterranean.

The var. **unifasciata** Mont. also occurs at S. Thomé.**Peringia ulvae** (Pennant).*Turbo ulvae* Pennant, Brit. Zool. IV., p. 132, pl. 86, f. 120.

S. Thomé, rare; Senegal (Dautzenberg); Baltic; Great Britain to Gibraltar; Mediterranean.

Sub-fossil: Nouakchott (Dautzenberg).

Dollfus has recently shewn (*J. de Conch.*, vol. 59, pp. 234-248) conclusively that Baster's *Turbo stagnalis* is a prior name for our *Paludestrina ventrosa* Mont., and that the name *ulvae* Penn. must be adopted for the shell now recorded.**Truncatella clathrus** Lowe.Lowe, *Zool. Journ.*, V., p. 303.

S. Thomé, a few specimens; W. Indies (Shuttleworth).

Hipponyx antiquatus (L.).*Patella antiquata* Linné, Syst. Nat., ed. xii., p. 1259.

S. Thomé, not common; Principe (Nobre); Cape Verdes, Baie de Hann (Dautzenberg); Loanda (Dunker); West Indies; Fernando Noronha and Ascension (Smith); Australia and Polynesia (Dautzenberg).

Capulus intortus Lam.

Lamarck, Anim. Sans Vert., vi., pt. 2, p. 18.

S. Thomé, fairly plentiful; W. Indies; Tryon also gives Mauritius, Philippines, and Paumotu.

Mitrularia equestris (L.).

Patella equestris Linné, Syst. Nat., ed. x., p. 780.

S. Thomé, not uncommon; Principe, Cape Verdes and Angola (Nobre). According to Tryon, it occurs throughout the China Sea, Indian Ocean, W. Indies, on the west coast of Central America, and in the Galapagos Is.

Natica turtoni Smith.

Smith, Mar. Moll. St. Helena, P.Z.S., 1890, p. 269, pl. xxi., f. 14, 14a.

S. Thomé, rare; St. Helena (Smith); Cape Verdes (Bouvier); Bilaouak, Nouakchott, and Rufisque (Dautzenberg).

Natica dillwyni Payr.

Payraudeau, Cat. Moll. Corse, p. 120, pl. 5, f. 27, 28.

S. Thomé, not common; Canaries and Madeira, abundant (Watson); St. Helena and West Indies (Smith); Mediterranean.

Natica (Mammilla) lactea Guilding.

Natica lactea Guilding, Trans. Linn. Soc., 1831, xiii., p. 29.

Natica lactea Philippi in Conch. Cab., 2nd ed., p. 64, pl. x., f. 7.

S. Thomé, common; Senegal (Dautzenberg); Santa Luzia, C.V. (Prince de Monaco); St. Vincent, C.V. (Chalmers); Canaries; Rufisque and W. of Cape Rouge (Dautzenberg); West Indies.

Sigaretus concavus Lam.

Lamarck, Anim. Sans Vert., vi., 2nd part, p. 208.

Weinkauff, Conch. Cab., 2nd. ed., p. 17, pl. iii., f. 1—3.

S. Thomé, fairly common; Baies de Hann et de Rufisque (Dautzenberg); Dakar and Loanda (Rattray); Los Is., Lobito Bay, Mossamedes and Bahia de los Tigres (Dautzenberg).

Ianthina violacea Bolten.

Bolten, Mus. Bolt., p. 75 (1798).

Ianthina fragilis Lamarck, Anim. Sans Vert., p. 89 (1801).

S. Thomé, common; St. Vincent, C.V.; Madeira and Canaries (McAndrew); Angola (Nobre); Great Britain; Brittany (Cailliaud and Taslé); common in the Atlantic.

Epitonium commutatum (Monts.).

Scalaria commutata Monterosato, Ann. Mus. Civ. Genova, ix., p. 420.

S. Thomé, not uncommon; Lemsid, Bilaouak, Banana, and Mossamedes (Dautzenberg); Canaries, Cape Verdes, Madeira; Great Britain to Mediterranean; West Indies; Mauritius and Hawaiian Islands (Dautzenberg).

Epitonium crenatum (L.).

Turbo crenatus Linné, Syst. Nat., ed. x., p. 765.

S. Thomé, rare; Canaries; Mediterranean; Atlantic from the Gulf of Gascony to Morocco; Cansado and Mossamedes (Dautzenberg).

Epitonium pulchellum (Bivona).

Scalaria pulchella Bivona, Nuove Gen., p. 21.

S. Thomé, rare; Mediterranean; Madeira (Watson).

Epitonium smithi (Watson).

Scalaria smithii Watson, Journ. Linn. Soc., Zoology, vol. 26, p. 253, pl. 19, f. 20.

S. Thomé, rare; Madeira (Watson).

Epitonium hellenicum (Forbes).

Scalaria hellenica Forbés, Rep. Aeg. Inv., p. 189.

S. Thomé, rare; Canaries; Mediterranean.

Epitonium grossicostatum (Nyst).

Scalaria grossicostata Nyst, Tableaux, p. 36.

S. Thomé, rare; West Indies.

M. de Boury has kindly confirmed our identification of this species. It is probably more often known as *E. hotessierianum* d'Orb.

Epitonium candidissimum (Monts.).

Scalaria candidissima Monterosato, Journ. de Conch., 1877, vol. xxv., p. 37, t. 2, f. 5.

S. Thomé, not rare; Algeria.

M. de Boury has named this species for us.

Epitonium atlanticum (de Boury).

S. Thomé.

Epitonium tenuipunctatum (de Boury).

S. Thomé.

The names of this and of the preceding species we also owe to M. de Boury, and gather from him that they will be described in a paper shortly to appear.

Eulima microstoma Brus.

Brusina, *J. de Conch.*, xvii., p. 244 (1869).

S. Thomé, common; Mediterranean; Madeira (Watson).

Eulima atlantica Smith.

Smith, P.Z.S., 1890, p. 278, pl. 23, f. 25.

S. Thomé, rare ; St. Helena (Smith) ; Port Elizabeth (Sowerby).

Obeliscus suturalis von Maltzan.

Von Maltzan, Nachrichtsbl. d. d. Malak. Ges., 1885, p. 26.

Dautzenberg, Contrib. Faune Afr. Occ., I., p. 93, pl. iii., f. 4, 5.

S. Thomé, rare ; Rufisque, Los Is., Banana and Congo estuary (Dautzenberg) ; Goree (von Maltzan).

Obeliscus dolabratus (L.).

Trochus dolabratus Linné, Syst. Nat., ed. x., p. 760.

S. Thomé, not common ; West African coast to Durban and common in the Portuguese Colonies (Nobre) ; St. Helena, W. Indies, Red Sea, Indian and Pacific Oceans (Smith).

Turbonilla bulinea (Lowe).

Menestho bulinea Lowe, P.Z.S., 1840, p. 40.

S. Thomé, rare ; Madeira and Mediterranean (Watson).

Pyrgulina tricineta (Jeffreys).

Odostomia tricineta Jeffreys, Moll. Piedmont, p. 44, f. 12, 13.

S. Thomé, rare ; Piedmont ; Algeria ; Canaries ; N.W. France to Mediterranean and Madeira (Watson).

Pyrgulina spiralis (Mont.).

Turbo spiralis Montagu, Test. Brit., II., p. 323, pl. xii., f. 9.

S. Thomé, rare ; Baie de Cansado (Dautzenberg) ; Atlantic from Great Britain to Gulf of Gascony ; Mediterranean.

Pyrgulina excavata (Phil.).

Rissoa excavata Philippi, Enum. Moll. Sic., II., p. 128.

S. Thomé, scarce ; Great Britain ; Mediterranean.

Nerita senegalensis Gmel.

Gmelin, Syst. Nat., ed. xiii., p. 3686.

Sowerby, Thes., Nerita, pl. 466, f. 76.

S. Thomé, common ; Principe (Nobre) ; Spanish Guinea (Hidalgo) ; Cape Verdes (Bouvier) ; Senegal to Angola.

Phasianella pullus (L.).

Turbo pullus Linné, Syst. Nat., ed. xii., p. 1233.

S. Thomé, common ; Madeira, common (Watson) ; Canaries ; Great Britain to Mediterranean and Mogador.

(To be continued).

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 1892. Rosevear, John Burman, 109, New King's Rd., Fulham, S.W.
 1910. *L* Rowe, A. W., M.S., M.B., M.A.C.S., F.G.S., Shottendane, Margate.
 1914. Saban, Alfred J., 318, Ivydale Road, Peckham Rye, S.E.
 1906. Salisbury, Albert E., 12a, The Park, Ealing, W.
 1877. *P* Scharff, Robert F., Ph.D., M.R.I.A., Knockranny, Bray, co. Wicklow.
 1906. Schepman, M. M., Bosch en Duin, Huister Heide, Utrecht, Holland.
 1895. *L* Schill, C. H., Crosten Towers, Alderley Edge.
 1886. Scott, Thomas, LL.D., F.L.S., 280, Victoria Road, Torry, Aberdeen.
 1893. Shackleford, Rev. Lewis John, 66, Granville Road, Blackpool.
 1910. *L* Shaw, H. O. N., B.Sc., F.Z.S., Skreens Park, Roxwell, near Chelmsford.
 1904. Shaw, Rev. W. A., Peper Harow Rectory, Godalming.
 1906. Shopland, Commander E. R., 1, Estivals, Oulton Broad.
 1910. Shrubsole, George, Elm Bank, Workington, Cumberland.
 1895. Sich, Alfred, F.E.S., Corney House, Chiswick, W.
 1906. Sikes, F. H., M.A., F.L.S., Sackville House, Sevenoaks.
 1905. Simpson, James, c/o G. Sim, Esq., A.L.S., 52, Castle Street, Aberdeen.
 1902. Smallman, Raleigh S., Eliot Lodge, Albemarle Road, Beckenham.

1886. *P* Smith, Edgar A., I.S.O., F.Z.S., 22, Heathfield Road, Acton, W.
 1892. Smith, Mrs. Louisa J., Monmouth House, Monmouth St., Topsham, Exeter
 1899. *Z* Smith, Mrs. Lucy A., Cricklade Street, Cirencester.
 1907. Smith, Maxwell, Hartsdale, Westchester Co., New York, U.S.A.
 1894. Smith, Wm. Chas., 92, Dawes Road, Fulham, S.W.
 1900. Solly, E. H., 3, South Street, Deal, Kent.
 1886. Sowerby, Geo. Brettingham, F.L.S., River Side, Kew, near London.
 1907. Spence, G. C., 10, Pine Grove, Monton, Eccles, Lancs.
 1914. Stainton, Ernest, 70, Jubilee Road, Doncaster.
 1906. Stalley, Henry J., Thorntona, Oxted, Surrey.
 1886. Standen, Robert, The Museum, The University, Manchester.
 1911. Standish, C. M., Prospect House, Weldbank, Chorley.
 1903. *Z* Stelfox, A. W., The Bungalow, Ballywilliam, Donaghadee, co. Down.
 1906. Step, Edward, F.L.S., Oakwood House, Ashstead, Surrey.
 1910. Stephenson, H. L., 90, Tempest Road, Beeston Hill, Leeds.
 1908. *Z* Stobart, H. J. S., Belbroughton, Stourbridge.
 1896. Stonestreet, Rev. W. T., B.D., F.R.S.L., c/o The New Church Book
 Depôt, 18, Corporation Street, Manchester.
 1897. Stracey, Bernard, M.B., Priory Lodge, 16, New Walk, Leicester.
 1890. Stubbs, Arthur Goodwin, The Meads Cottage, Hailey Lane, Hertford.
 1893. Stump, Edward Consterdine, 13, Polefield Road, Blackley, Manchester.
 1912. Sturt, E. G. M., Lismore, Cavendish Road, Weybridge.
 1912. Sturt, G. L., Lismore, Cavendish Road, Weybridge.
 1895. Swanton, E. W., The Educational Museum, Haslemere, Surrey.
 1888. *P* Sykes, Ernest Ruthven, B.A., F.L.S., Longthorns, Blandford.

 1910. Tattersall, W. M., D.Sc., The Museum, The University, Manchester.
 1895. Taylor, Frederick, 32, Landseer Street, Park Road, Oldham, Lancs.
 1907. Taylor, G. H., School House, Higher Blackley, Manchester.
 1904. *L** Taylor, Gerald Medland, Rossall School, Fleetwood.
 1907. Taylor, J. Kidson, 45, South Avenue, Buxton.
 1904. * Taylor, Thos., Wotea, Grafton Road, Auckland, New Zealand.
 1903. Thaanum, D., 5, Church Street, Hilo, Hawaiian Islands.
 1908. Thomas, Rev. R. E., M.A., St. Martin's Clergy House, Salisbury.
 1907. *Z* Thornton, H. G., Kingsthorpe Hall, Northampton.
 1886. *Z* Tomlin, J. R. le Brockton, M.A., F.E.S., Lakefoot, Reading.
 1906. Turton, Lt.-Col. W. H., D.S.O., R.E., 80, Caledonia Place, Clifton, Bristol.

 1907. Upton, Charles, Rooksmoor, Tuffley Avenue, Gloucester.

 1914. Van der Sleen, Dr. W. G. N., Eidenoutstraat 63, Haarlem, Holland.
 1899. Vaughan, J. Williams, J.P., Pen-y-maes, Hay, *via* Hereford.
 1897. Vignal, Louis, 28, Avenue Duquesne, Paris.
 1902. Vincent, W. C. W., 39, West Bank, Stamford Hill, London, N.

 1898. Wakefield, H. Rowland, 7, Montpelier Terrace, Swansea.
 1891. Walker, Bryant, 1306, Dime Bank Building, Detroit, Michigan, U.S.A.
 1907. Wallis, E. A., Springfield, West Parade, Scarborough.
 1900. *Z* Watson, Hugh, Bracondale, The Avenue, Cambridge.
 1908. Weaver, G. H., 31, Devonshire Road, Palmer's Green, N.
 1900. Webb, Walter F., 202, Westminster Road, Rochester, N.Y., U.S.A.

1902. Weeks, Wm. H., jr., 508, Willoughby Avenue, Brooklyn, N.Y., U.S.A.
 1895. Welch, Robert John, M.R.I.A., 49, Lonsdale Street, Belfast.
 1913. Western, W. H., 9, Redearth Road, Darwen.
 1907. Wheat, Silas C., 987, Sterling Place, Brooklyn, N.Y., U.S.A.
 1886. Whitwell, Wm., Brookside, Darley Knowle, Warwickshire.
 1911. * Williams, James M. M., Imperial House, Pontllynn, Cardiff.
 1889. Williams, John M., 31, Grove Park, Liverpool.
 1913. Winckworth, Ronald, 37, Upper Rock Gardens, Brighton.
 1890. Wood, Albert, Midland Lodge, Sutton Coldfield, Warwickshire.
 1910. Woodcock, R., Fauvic, Jersey.
 1901. Z Woodruffe-Peacock, Rev. E. A., F.L.S., etc., Cadney, Brigg, Lincs.
 1911. Woods, Rev. F. H., B.D., Bainton Rectory, Driffeld.
 1898. Woods, Henry, M.A., F.G.S., 39, Barton Road, Cambridge.
 1886. Z Woodward, Bernard B., F.L.S., etc., 4, Longfield Rd., Ealing, W.
 1903. Worsdale, R., 102, Dudley Terrace, Dudley Road, Grantham.
 1914. Worsfold, Herbert W., 28, Melody Road, Wandsworth, S.W.
 1906. Wragge, Clement L., F.R.G.S., etc., Perth, Western Australia.
 1895. Wright, Charles East, Woodside, Rockingham Road, Kettering.



Fluviatile Mollusca from Port Patrick.—The following notes refer to specimens which were collected by the writer during the month of February, 1914, in the vicinity of Port Patrick, Wigtownshire, with the exception of *Pisidium casertanum*, which was found at Glenluce, some twenty miles from Port Patrick. My best thanks are due to Mr. B. B. Woodward for the help he so kindly gave me in working out my collection. *Limnaea pereger*.—This species was abundant on the Killantringan Moor, where it was found in small, shallow ditches in which there were but a few inches of water. A few larger specimens were also taken in the Port Patrick Reservoir. *Limnaea truncatula*.—This species was found in both the localities mentioned under *L. pereger*, being in each case much more numerous. In the reservoir the molluscs were found on small stones, but on the moor they were clinging to submerged grasses and weeds. One example of this species was also taken in a ditch which drains the marsh in the Sandeel Bay. The specimens obtained on the moor were very turreted. *Ancylus fluviatilis*.—This species abounds in a small stream flowing into the Port Patrick Reservoir. *Pisidium personatum*.—This species was taken more abundantly than any other of the *Pisidia*, occurring in great numbers in almost every wayside pool and well. It was also found in the Dunskey Upper Lake, and in the ditches on the Killantringan Moor, the examples from the latter locality being very heavy-hinged. *Pisidium nitidum*.—A few specimens were taken on the Killantringan Moor, but it was not found in company with the preceding species. In the Upper Dunskey Lake large numbers were found in the shallow water near the bank, while *P. personatum* seemed to occur only in the ditch at the upper end of the lake where the weedy growth was dense. *Pisidium casertanum*.—This species was not met with near Port Patrick, but a few examples were obtained from a ditch on the Glenluce golf course.—JOHN N. KENNEDY (Read before the Society, Sept. 9th, 1914).

THE MARINE MOLLUSCA OF SÃO THOMÉ, I.

By J. R. LE B. TOMLIN, M.A., AND L. J. SHACKLEFORD.

(Read before the Society, Sept. 9th, 1914).

(Concluded from page 256).

Astræa (Bolma) rugosa (L.).

Turbo rugosus Linné, Syst. Nat., ed. xii., p. 1234 (1767).

S. Thomé, not uncommon; Mediterranean; Atlantic shores of Spain and S.W. France; Madeira, Canaries and Azores.

Clanculus kraussi (Phil.).

Trochus kraussi Philippi, Conch. Cab., 2nd ed., p. 82, pl. 14, f. 14 (1846).

S. Thomé, rare; Baie du Lévrier to Senegal (Dautzenberg); Durban (Sowerby).

Clanculus guineensis (Gmelin).

Trochus guineensis Gmelin, Syst. Nat., ed. xiii., p. 3574 (1791).

Fischer in Kiener, Spec. Gen. Trochus, p. 221, pl. lxxii., f. 3.

S. Thomé, fairly common; Spanish Guinea (Hidalgo); Libreville, Liberia and Gaboon (Dautzenberg).

Omphalius fasciatus (Born).

Trochus fasciatus Born, Mus. Caes. Vindob., p. 331, t. 12, f. 3, 4 (1780).

S. Thomé, several specimens; West Indies.

Rhodinoliotia gen. nov.

This name is proposed for the shell described as *Cyclostrema roseotincta* Smith from Whydah. This species has little to do with *Cyclostrema*, and Mr. Smith was evidently doubtful at the time where to place it. It is a minute shell, with vague rosy markings, a well-marked umbilicus, continuous peristome, and strong spiral ridges. In form it somewhat resembles certain *Minolias*, and is very like *M. tenuis* (Sow.), Ceylon, but it cannot belong to the *Trochidæ*, as the shell is not nacreous, and we should assign it to the *Liotiida*.

Rhodinoliotia roseotincta (Smith).

Cyclostrema roseotincta Smith, P.Z.S., 1871, p. 737, pl. 75, f. 27.

S. Thomé, not uncommon; Whydah (Smith).

Teinostoma punctatum Jous.

Teinostoma punctatum Jousseume, Rev. & Mag. de Zool., 1872, p. 337, pl. 18, f. 5.

S. Thomé, common; dredged off Boulbiné, Conakry, Cotonou, Los Is., and Grand Bassam (Dautzenberg); Principe (Jousseume).

Teinostoma liratum (Smith).

Ethalia lirata Smith, P.Z.S., 1871, p. 737, pl. 75, f. 23.

Teinostoma lirata Sm., Pilsbry in Tryon, Man. of Conch., xi., p. 461 pl. lix., f. 40.

S. Thomé, rare; Whydah (Smith); W. of Cape Rouge and Libreville (Dautzenberg).

Haliotis tuberculata L.

Linné, Syst. Nat., ed. x., p. 780 (1758).

S. Thomé, common; Atlantic from the Channel Isles to Benguela; Madeira and Canaries (Watson); Cape Verdes and Principe (Nobre).

Fissurella nubecula (L.).

Patella nubecula Linné, Syst. Nat., ed. x., p. 785 (1758).

Fissurella nubecula L., Moll. du Roussillon I., p. 438, pl. 53, f. 11—14.

S. Thomé, common; Cape Verdes and Principe (Nobre); Atlantic from the Gulf of Gascony to Benguela; Mediterranean; Port Elizabeth (Sowerby).

Fissurella mutabilis Sow.

Sowerby, Conch. Illust., f. 67—70 (1835).

S. Thomé, fairly common; Table Bay, Natal Coast, Port Elizabeth (Sowerby); St. Helena (Smith).

Fissuridea menkeana (Dkr.).

Fissurella menkeana Dunker, Zeitsch. f. Malak., 1846, p. 26.

Dunker, Index Moll. Guin., p. 37, pl. v., f. 13—15.

S. Thomé, not uncommon; Cansado, Cape Rouge, and Rufisque (Dautzenberg); Loanda; Benguela.

Fissuridea gibberula (Lam.).

Fissurella gibberula Lamarck, Anim. Sans Vert., vi., p. 15 (1819).

F. philippiana Dkr., Zeitschr. f. Mal., 1846, p. 26; Ind. Moll. Guin., p. 37, pl. 5, f. 23—25.

S. Thomé, common; coasts of France and Spain; Mediterranean; Canaries (McAndrew); S. Helena? (Smith). With regard to the last record, S. Helena specimens in coll. Tomlin received from Capt. Turton and presumably identical with Mr. Smith's examples, are certainly not *gibberula* Lam., and appear to be small *parvisforata* Sow., a Cape species.

Lucapinella limatula (Rve.).

Fissurella limatula Reeve, Conch. Icon., pl. xv., f. 115 (1850).

S. Thomé, rare; Cansado and W. of Cape Rouge (Dautzenberg); West Indies; Florida.

Chiton lyratus Sow.

Sowerby, Conch. Illust., f. 126 (1840).

Reeve, Conch. Icon., pl. xviii., f. 110.

Sowerby, Mar. Shells S. Afr., App. p. 19.

S. Thomé, one perfect specimen and many valves; Dakar (Dautzenberg); Port Elizabeth (Sowerby).

Dentalium (Lævidentalium) gruveli (Dautzenberg).

Dautzenberg, Contrib. Faune Afr. Occ., I., p. 109, pl. iii., f. 21—23 (1910).

S. Thomé, not uncommon; Cansado, Pte. du Repos, B. de Rufisque, W. of Cape Rouge (Dautzenberg).

Dentalium rubescens Desh.

Deshayes, Mem. Soc. Hist. Nat. (Paris) II., p. 363, pl. 16, f. 23—25 (1825).

S. Thomé, common; Canaries (McAndrew); Mediterranean.

Weinkauff and Dautzenberg wrongly call this species *rufescens*.

Ostrea lacerata Hanley.

Hanley, P.Z.S., 1845, p. 106.

O. lacerans Reeve, Conch. Icon., pl. xxii., f. 51.

S. Thomé, common on rocks exposed at low water; Senegal and Morocco (Dautzenberg); Cape Verdes (Nobre).

G. F. Dollfus (Quaternaire marin du Senegal, p. 64) unites to this species *O. stentina* Payr., *pauciplicata* Desh., ? *plicatula* Gmel., *cristata* Hidalgo, and *guineensis* Dunk. If the identification is confirmed *O. stentina* Payr. has priority (1826). *O. stentina* is recorded from the Mediterranean, Portugal, Morocco, Canaries, and Madeira.

Fossil, at Timardine and N' Tibrau in Senegal (Dollfus).

Most authors, probably following Reeve, quote the name of this shell as *lacerans*. Hanley's name, however, was *lacerata*.

Spondylus powelli Smith.

Smith, *Journ. of Conch.*, vii., p. 70 (1892).

S. Thomé, rare; Madeira; Cape Verdes; Canaries (Watson); Liberia and Senegal (Dautzenberg).

The Rev. R. Boog Watson's collection contains a specimen which was brought alive to Lowe in February, 1852.

Spondylus gaederopus L.

Linné, Syst. Nat., ed. xii., p. 1136 (1767).

S. Thomé, common; Cape Verdes; Mediterranean; Angola (Nobre).

Pecten flabellum (Gmel.).

Ostrea flabellum Gmel., Syst. Nat., ed. xiii., p. 3321 (1791).

Pecten tissotii Bernard, Descrip. d'espèces nouv., *Journ. de Conch.*, vii., p. 91, pl. i., f. 2.

S. Thomé, valves only; Principe (Dohrn); Gaboon (Chatelier); Conakry to Congo estuary (Dautzenberg).

Pecten nodosus (L.).

Ostrea nodosa Linné, Syst. Nat., ed. x., p. 1145 (1758).

S. Thomé, several fine examples; Gulf of Mexico (Reeve); Brazil (Sowerby's *Thesaurus*).

Melina vulsella (Lam.).

Perna vulsella Lamarck, Anim. Sans Vert., vii., p. 78 (1822).

S. Thomé, fairly common; Principe (Nobre); Loanda and Cape Verdes (Clessin and Nobre); West Indies.

Nobre erroneously describes these shells as *Perna isognomum* L.

Pinna pernula Bolten.

Bolten, Mus. Bolt., p. 160 (1798).

S. Thomé, several fine specimens; Principe, Cape Verdes, and Angola (Nobre); St. Helena, Madeira and S. Africa (Smith); West Indies (Chemnitz). This name cannot be credited to Chemnitz as that author was not binomial.

Mytilus tenuistriatus Dkr.

Dunker, Index Moll. Guin., p. 47, pl. 9, f. 1—3 (1853).

S. Thomé, a few specimens; Loanda (Dunker); Conakry, Grand Bassam, Libreville (Dautzenberg).

Mytilus senegalensis Lam.

Lamarck, Anim. Sans Vert., vi., 1st part, p. 122 (1819).

Clessin, Conch. Cab., 2nd ed., p. 38, pl. xi., f. 3 and 4.

S. Thomé, common; Principe, Senegal; Cape Verdes; Baie de Hann, Conakry, Boulbiné, Tamara, Los Is., Mossamedes, Praya Amelia (Dautzenberg); Benguela (Dautzenberg); Spanish Guinea (Hidalgo). Hidalgo¹ identifies with this species *M. variabilis* Krauss² from Table Bay, Natal, and Port Elizabeth.

Arca noe L.

Linné, Syst. Nat., ed. x., p. 593 (1758).

S. Thomé, valves only; Cape Verdes; Senegal to Loanda; West Indies; Panama (v. Ihering); Atlantic coast of U.S.A. as far north as Cape Hatteras (Stearns).

¹ Moll. de la Guin. Esp., p. 525.

² Sudafr. Moll., p. 25, pl. 2, f. 5.

Arca bouvieri P. Fischer.

Fischer, *Journ. de Conch.*, xxii., p. 206; xxiv., p. 239, pl. viii., f. 2 (1874).
Lamy, *Journ. de Conch.*, lv., p. 24.

S. Thomé, rare; Annobon; St. Helena (Dautzenberg); Cape Verdes, common (Chalmers); Bata, Congo, and Rufisque (Dautzenberg); Angola (Nobre).

Arca sanctæ-helenæ Smith is a synonym.

Arca (Fossularca) lactea L.

Arca lactea Linné, Syst. Nat., ed. x., p. 694 (1758).

S. Thomé, common; Cape Verdes, Canaries and Ascension; Great Britain to Mediterranean; Cansado and Arguin Is. (Dautzenberg); Loanda (Dunker); Cape Colony and Natal; Suez (Cooke); Bombay (Melvill); Singapore (Archer).

If *A. zebuensis* Rve. is identical, the Philippines may be added.

Fossil: Timardine, Senegal (Dollfus).

We have not detected *A. afra*¹ Gmel. from S. Thomé.

Arca (Acar) reticulata Gmel.

Arca reticulata Gmelin, Syst. Nat., ed. xiii., p. 3311 (1791).

Arca domingensis Lamarck, Anim. Sans Vert., vi., p. 40 (1819).

S. Thomé, common; Cape Verdes, St. Helena, Ascension, S. Africa, W. Indies; for its further world-wide distribution see Watson in Journ. Linn. Soc. (Zoology), vol. 26, p. 273, and Lischke, Jap. Meer. Conch., ii., p. 142.

Arca (Anadara) geissei (Dunker) Kobelt.

Kobelt, Conch. Cab., 2nd ed., p. 163, pl. xli., f. 5 and 6 (1891).

Lamy, *Journ. de Conch.*, lv., p. 238.

S. Thomé, not uncommon; Senegal: Goree, Dakar (Chautard); Santa Luzia, Cape Verdes (Prince de Monaco).

Arca (Anadara) stigmosa Dkr.

Dunker, Index Moll. Guin., p. 46, pl. 9, f. 8—11 (1853).

S. Thomé, not common; Loanda.

Lamy unites this with *A. decussata* Sow. (*Journ. de Conch.*, lv., p. 65).

Glycymeris concentricus (Dkr.).

Pectunculus concentricus Dunker, Index Moll. Guin., p. 47 (1853).

S. Thomé, valves only; Loanda (Dunker); Dakar, Goree, W. of Cape Rouge, Ivory Coast, Los Archipelago, Grand Popo, and Jackville (Dautzenberg).

¹ cf. Dautz. Contr. Faune Afr. Occ., I., p. 119.

Glycymeris stellatus (Gmel.).

Venus stellata Gmelin, Syst. Nat., ed. xiii., p. 3289 (1791).

S. Thomé, valves only; Mediterranean; Portugal; Madeira; Principe; Goree; Senegal.

We are indebted to the Marchese di Monterosato for this name.

The correct name for this species is very doubtful; for a discussion thereon see Lamy in *Journ. de Conch.*, vol. 59, p. 144.

Nuculana bicuspidata (Gould).

Nucula bicuspidata Gould, Boston Journ. Nat. Hist. V., p. 292, pl. xxiv., f. 8 (1845).

S. Thomé, fairly common; Pointe Rey, Port Etienne, Cansado, Arguin, El Mamghar, Pointe du Repos, Rufisque, Cape Rouge (Dautzenberg); Liberia; Gaboon; Cape Verdes (Bouvier).

Cardita tankervillii (Wood).

Venericardia tankervillii Wood, Ind. Test. Supp., p. 57, pl. 2, f. 4 (1828).

S. Thomé, a single specimen; W. Coast of Africa.

There can be no doubt that the Australian habitat, formerly given for this species, is erroneous. Mr. Hedley said, when he was in London last, that he had no cognizance of its occurrence in Australian waters.

Cardita senegalensis Rve.

Reeve, P.Z.S., 1843, p. 192; Conch. Icon., pl. iv. f. 16.

S. Thomé, valves only; Cape Verdes; W. Africa from Cape Blanco to Loanda.

Cardita trapezia (L.).

Chama trapezia Linné, Syst. Nat., ed. xii., p. 1138 (1767).

S. Thomé, abundant; Portugal to Mediterranean; Conakry, Boulbiné, Los Is., Cotonou, Libreville, Banana (Dautzenberg); Angola (Welwitsch).

Cardita ajar Brug.

Bruguère, Encycl. Méthod. I., p. 406 (1792).

S. Thomé, common; W. Africa, from Cape Blanco to Dahomey.

Crassatellites contraria (Gmel.).

Venus contraria Gmelin, Syst. Nat., ed. xiii., p. 3277 (1791).

Dunker, Index Moll. Guin., p. 49, pl. 9, f. 4—7.

S. Thomé, valves only; Rufisque, Conakry, Boulbiné, Crawford Bank, Tamara, Roume Is., Los Is., Libreville (Dautzenberg).

var. **coccinea** Dautz.

Voy. de la Goëlette Melita, p. 43 (1891).

S. Thomé; Rufisque (Dautzenberg).

Cardium ringens Gmel.

Gmelin, Syst. Nat., ed. xiii., p. 3254 (1791).

Reeve, Conch. Icon., pl. i., f. 6.

S. Thomé, valves only; Cape Verdes (Stearns); Principe (Nobre); a well-known and widely distributed West African species from Cape Blancô to Mossamedes.

Cardium (Laevicardium) aeolicum Born.

Cardium aeolicum Born, Mus. Caes. Vindob. Test., pt. i., p. 36 (1780).

S. Thomé, valves only; Cape Verdes (Nobre); Angola (Welwitsch).

Papyridea soleniformis (Brug.).

Cardium soleniforme Bruguière, Encycl. Méthod., I., p. 235 (1789).

S. Thomé, not uncommon; Cape Verdes (Dunker and Nobre); Azores and St. Helena (Smith); West Indies, Brazil and W. coast of Central America (Smith).

For synonymy see 'Challenger' Lamellibranchiata, p. 161.

Smith records Linné's *Solen bullatus* as indeterminable. This name invalidates *Solen bullatus* Chem., even if the latter were strictly binomial. The next available name seems to be that of Bruguière.

Chama crenulata Lam.

Lamarck, Anim. Sans Vert., vi., 1st pt., p. 94 (1819).

C. senegalensis Rve., Conch. Icon., pl. ii., f. 5.

S. Thomé, rare; Cape Verdes; Principe; Goree, Port Etienne, Cansado, C. Timiris, Manata, between Lemsid and Bilaouak, between Rufisque and Hann, B. of Rufisque, and W. of Cape Rouge (Dautzenberg); Whydah (Smith); Conakry (Rattray).

Basterotia oblonga Smith.

Smith, P.Z.S., 1890, p. 303, pl. 22, f. 5.

S. Thomé, valves only; S. Helena (Smith).

Meretrix (Pitaria) roemeri (Tomlin & Shackleford).

Pitaria roemeri Tomlin & Shackleford, *Journ. of Conch.*, vol. 14, p. 96 (1913).

S. Thomé, rare; Principe (Römer).

Venus casina L.

Linné, Syst. Nat., ed. xii., p. 1130 (1767).

S. Thomé, valves only; Whydah (Smith); Senegal (Sowerby); Madeira, very abundant (McAndrew); Cape Verdes (Nobre); Canaries, frequent (McAndrew); Norway to Mediterranean.

Venus lyra Hanley.

Hanley, P.Z.S., 1844, p. 161.

S. Thomé, valves only; Principe and Angola (Nobre); Gulf of Guinea (Mus. Cuming).

Antigona venetiana (Lam.).

Venus rudis Poli, Test. Sicil., II., p. 94, f. 15, 16 (1795).

Cytherea venetiana Lamarck, Anim. Sans Vert., v., p. 569 (1818).

S. Thomé, valves only; Cape Verdes (Talisman); Canaries (McAndrew); St. Helena (Smith); Madeira, very abundant (Watson); Bay of Biscay to Mediterranean and Black Sea (Watson).

We cannot accept Poli's name as binomial.

Venerupis irus (L.).

Donax irus Linné, Syst. Nat., ed. x., p. 683 (1758).

S. Thomé, rare; Cansado (Dautzenberg); Canaries (McAndrew); Madeira, abundant (Watson); Mogador (Watson); Britain to Mediterranean; Black Sea (Dautzenberg).

Ungulina alba Dunker (ex Rang ms.).

Rang in Dunker, Index Moll. Guin., p. 56, pl. viii., f. 17—19 (1853).

S. Thomé, rare; widely distributed on the W. African coast from Senegal to Loanda.

Gari castrensis (Spengler).

Solen castrensis Spengler, Skriv. Naturhist. Selsk., iii., pl. 2, p. 110 (1794).

S. Thomé, rare; Guinea (Spengler); Lagos (Brit. Mus.).

Spengler's original locality was Guinea; Reeve gave it from Sorogon, Isle of Luzon instead, but his fig. 32 does not appear to represent the true *castrensis* at all, and is probably a young *G. oriens* Desh., of which the adult is figured on pl. 1. The latter is the eastern analogue of *G. castrensis* Sp., and Reeve's Philippine locality mentioned above should be transferred to it. It was originally described from Japan.

Sanguinolaria vitrea Desh.

Deshayes, P.Z.S., 1854, p. 326.

S. Thomé, rare; S. Thomas (Brit. Mus.).

This species was described without locality. The British Museum has examples labelled "S. Thomas"—presumably the West Indian island.

Tagalus angulatus (Sowerby).

Solecurtus angulatus Sowerby in Reeve, Conch. Icon., pl. viii., f. 37 (1874).

S. Thomé, rare; Senegal to Lobito (Dautzenberg).

Mactra glabrata L.

Linné, Syst. Nat., ed. xii., p. 1125 (1767).

Weinkauff, Conch. Cab., 2nd ed., p. 66, pl. xxiii., f. 3 and 3a.

S. Thomé, common; Cape Verdes; dredged at many places from Dakar to Mossamedes (Dautzenberg).

Standella ambigua (Weink.).

Mactra ambigua (sic) Weinkauff, Conch. Cab. *Mactra*, p. 74, pl. 26, f. 1, 1a (1884).

S. Thomé, rare; Cape Verdes (Nobre); R. Gambia.

Reeve, under *Mactra silicula* Desh., mixed up two species, giving the description of Deshayes' shell, but as locality "mouth of the Gambia" instead of "Bay of Manila" (Mus. Cuming). We have emended an obvious typographical error in Weinkauff's specific name.

Codakia (Jagonia) pecten (Lam.).

Lucina pecten Lamarck, Anim. Sans Vert., v., p. 543 (1818).

Delessert, Recueil Coq. de Lamarck, pl. vi., f. 8a—8c.

S. Thomé; W. of Cape Rouge (Dautzenberg); St. Vincent, C.V. (Chalmers); Angola (Nobre); Spanish Guinea (Hidalgo); Mediterranean.

Abundant and very variable in sculpture.

Divaricella divaricata (L.).

Tellina divaricata Linné, Syst. Nat., ed. x., p. 1120 (1758).

S. Thomé, valves only; Madeira, very common (Watson); Canaries; S. of England to Mediterranean; West Indies.

Lucina lamothei Dautz.

Dautzenberg, Mission Gruvel in Ann. de l'Inst. Océanogr., p. 100, pl. 3, f. 50—54 (1913).

S. Thomé, not uncommon; Conakry, Boulbiné, Los Is., Grand Bassam, Libreville, Banana, Congo estuary (Dautzenberg).

Semele modesta A. Adams.

A. Adams, P.Z.S., 1853, p. 95.

Amphidesma modesta A. Ad., Reeve, pl. vi., f. 35.

S. Thomé, not uncommon; Accra (Rattray); Principe, S. Thomé, and Fernando Po (Nobre); St. Helena (Smith). Mr. Smith¹ unites

¹ P.Z.S., 1890, p. 301.

this and seven other species with *S. cordiformis* Ch., but we are not prepared to acquiesce as far as *S. modesta* is concerned.

Tellina rubicincta Gld.

T. rubicincta Gould, Proc. Boston Soc. N.H., II., p. 37 (1845).

T. rubicunda Gould (emend.), Otia Conch., p. 196 (1862), not *T. rubicunda* Gmel.

S. Thomé, valves only; Cansado, Los Is., and Mossamedes (Dautzenberg); Liberia.

Gould's original name for this species must stand.

Tellina hyalina Gmel.

Gmelin, Syst. Nat., ed. xiii., p. 3235 (1791).

S. Thomé, rare; Loanda (Nobre); Guinea (Chemnitz).

Strigilla polyaulax nom. nov.

Tellina senegalensis Hanley, P.Z.S., 1844, p. 68: not *Tellina senegalensis* Gmel., Syst. Nat., ed. xiii., p. 3244 (1791).

S. Thomé, common; Senegal; Principe; Cotonou (Dautzenberg); Mossamedes.

We are obliged to rename this well-known species.

Macoma cumana (Costa).

Psammobia cumana O. G. Costa, Cat. Sist., p. 20, pl. ii., f. 7 (1830?).

S. Thomé, rare; Mediterranean; Morocco; Senegal; W. Africa, many localities from Conakry to Mossamedes (Dautzenberg); Port Elizabeth (Sowerby).

The title-page of Costa's work is dated 1829, but the introduction has 24/Nov./30.

Gastrana abilgaardiana (Spengler).

Tellina abilgaardiana Spengler in Nat. Selsk. Skriv., iv. (1798), pt. 2, p. 90.

S. Thomé, valves only; Cape Blanco to Senegal; Port Elizabeth (Sowerby).



Dextral Specimen of Clausilia bidentata.—During the examination of about 3,000 specimens of this species from Portmadoc, Carnarvonshire, I have come across a single example with a dextral shell. The specimen is of normal size and shape (11.9 × 2.6 mm.) and is not otherwise malformed. Jeffreys (Brit. Conch., i., p. 279) describes his var. *dextrorsa* as "resembling a *Pupa* in shape." Another specimen has been put on record by J. W. Taylor (*Journ. of Conch.*, iv., p. 265), and one by C. T. Cribb (ibid. xiii., p. 274), but the abnormality seems to be uncommon.—A. E. BOYCOTT (*Read before the Society*, Sept. 9th, 1914).

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN & IRELAND.

435th Meeting, held at the Museum, Manchester, Oct. 14th, 1914.

Mr. E. Collier in the chair.

The Hon. Librarian reported that the usual exchanges had been received.

A letter was read from the President approving of the abandonment of the Annual Meeting, and consenting to hold office for a second year.

New Members Elected.

John Noble Kennedy, R.N.

Alfred John Saban.

Papers Read.

"The Radula of *Hyalinia*—III., The Radular Characteristics of *Hyalinia helvetica* from Different Localities," by A. E. Boycott.

"*Helicella virgata* m. *sinistrorsum* near Scarborough," by W. Gyngell.

Exhibits.

By Prof. A. E. Boycott : *Hyalinia helvetica* from several localities, to illustrate his paper.

By Mrs. Gill : A fine specimen of *Pleiodon ovatus* Sw. ; and series of British and foreign *Phasianella*.

By Mr. G. C. Spence : *Otocothis planulata* Pfr., from Haiti ; and *Eutrochatella candida* Pfr., from Turk's Island, Bahamas.

In the Special Exhibit of *Planorbis spirorbis* and *Pl. vortex*, series were shown by Messrs. E. Collier, E. C. Stump, C. H. Moore, J. W. Jackson, R. Standen and Mrs. Gill. Mr. Jackson briefly explained the object of the exhibition, which was to try to ascertain if the true *Planorbis spirorbis* L. inhabited the British Isles. A comparison of British specimens with others from various parts of the continent and with the figures in reliable text-books seems to indicate that the great majority of British *Pl. "spirorbis"* agree better with *Pl. leucostoma* Michaud [= *Pl. rotundatus* Poir.] ; a few others are not unlike *Pl. septemgyratus* Ziegler ; while none can be said to quite agree with the typical North European *Pl. spirorbis* L.

436th Meeting, held at the Museum, Manchester, Nov. 11th, 1914.

Mr. E. Collier in the chair.

Additions to the Library announced and thanks voted :

"Manual of Conchology," part 89, by H. A. Pilsbry ; "Notes upon some Lower Californian *Helices*," by H. A. Pilsbry ; "The Method of Progression in *Truncatella* : List of Land and Freshwater Mollusks of Antigua," by H. A. Pilsbry and A. P. Brown ; "A Note on the Apparent Absence of Sexual Characters in the Shell of *Neritina fluviatilis*," by A. E. Boycott and J. W. Jackson (*from the respective authors*) ; and the usual periodicals received in exchange.

Donation to Autograph Letter Collection.

Letter from Captain Knocker, H.M.S. "Fly," May 25th, 1863, by J. R. le B. Tomlin.

The Hon. Secretary's Annual Report and the Reports of the London, the Leeds and the North Staffordshire Branches were read and adopted.

Paper Read.

Obituary Notice: A. J. Jukes-Browne, F.R.S., F.G.S., by J. Cosmo Melvill, M.A., D.Sc., F.L.S.

Exhibits.

By Mr. G. C. Spence: *Cyclophorus nilagiricus* Benson, from Khasia Hills, India.

By Mr. C. H. Moore: *Helicella virgata*, type, and var. *lutescens*, and *H. barbara*, from Llandudno, Oct. 27th, where it was extremely abundant, but small.

By Prof. A. E. Boycott: A series of *Pseudanodonta rothomagensis* Locard, from Bransford Bridge, River Teme, Worcestershire, collected by Mr. J. R. le B. Tomlin, August, 1914.

In the Special Exhibit of the genus *Alycaeus* rather more than two-thirds of the known species were shown by Messrs. E. Collier, G. C. Spence, and R. Standen. Mr. Collier gave an interesting description of the principal characteristics of this curious genus and its distribution. Included in his series was a large number acquired at the sale of the Buelow Collection. One example of *A. physis* Benson from Darjeeling, India, shown by Mr. Standen, contained the operculum, which was unknown when the shell was first described.

ANNUAL REPORT.

THE present is the thirty-seventh Annual Report of the Society.

At the last Annual Meeting the membership stood at 350, but the year now closed has been one of very regrettable loss, only partly compensated by the enrolment of new members.

During the year the Society has heard with much sorrow of the decease of four members, viz., Dr. Fitzsimons, Dr. Plant, Rev. Dr. McMurtrie, and Mr. A. J. Jukes-Browne, F.R.S., F.G.S. Dr. McMurtrie was elected in 1886, and his researches in Haddingtonshire and other Scottish counties have resulted in many new records. Mr. Jukes-Browne was known by many as a most courteous and obliging correspondent and a painstaking writer on the vexed nomenclature of the mollusca. A biographical sketch by Dr. James Cosmo Melvill will shortly appear in the *Journal of Conchology*. Letters expressive of the respectful sympathy of the members of the Society have been forwarded to the friends of these gentlemen.

The resignations of six members on the ground of want of time to pursue conchological research have been regretfully accepted. The names of some thirty-two other members have with much reluctance been struck off the roll in accordance with Rule 4. In some of these cases, perhaps in the majority, the cause of the lapse has been through getting out of touch with the Society, and a consequent loss of interest, through neglect to notify change of address. This is the occasion of quite unnecessary trouble and serious financial loss, and members are again urged to forward any new address to the Secretary, and also, in the event of not receiving the *Journal*, to notify him at once.

Against these losses through death, resignation, and lapse of membership, amounting to forty-five, seventeen new members have been elected during the year, so that the membership at the present time is 322.

The usual meetings have been held at the Museum, Manchester. Twenty-eight papers and notes have been read, and the exhibits have been interesting and numerous. As in former years, at most of the monthly meetings there has been a special exhibit of some group—a method which is very useful in the determination

of critical species. The following have been the special exhibits for the year :— The *Candidula* section of *Helix*, the genus *Helicigona*, *Urocoptidæ*, the section *Leptoconus* of *Conus*, *Partula*, and *Neritina*.

Owing to the outbreak of the war, and the possible inconvenience to our President, Mr. Bullen Newton, who was attending the meetings of the British Association in Australia, the Council felt it necessary to abandon the Annual Meeting, which had been fixed for the 24th October. An ordinary meeting was, however, held in October. The Council has satisfaction in knowing that this arrangement was agreeable to the President, and he has consented to retain office for the ensuing year. The other Officers and members of Council will also retain their offices.

The Council desires to place on record its high appreciation of the important services rendered to their country by members of the Society in both the Army and the Navy, and to wish for them a speedy and safe return to their homes.

The *Journal of Conchology* has been issued each quarter.

During the year members of the Society have collected specimens and contributed information for the Faunal Survey of Lancashire and Cheshire. The Council would commend the work to the notice of all members who have the opportunity of making observations in these two counties. Dr. W. M. Tattersall, The Museum, The University, Manchester, is the Hon. Secretary to the Committee.

About eighteen months ago it was decided to form a collection of autograph letters of eminent conchologists, and members having such letters that they could spare were urged to place them in the keeping of the Hon. Librarian. There has been a fair response to this request, but it is felt that many more interesting autograph letters could be gathered if members would give the matter their attention. Gifts of this nature will in future be acknowledged in the *Journal*. It is not merely the sentimental value attaching to such a collection, but its practical utility in determining the authenticity of labels attached to specimens in both public and private collections.

ANNUAL REPORT OF THE LEEDS BRANCH

FOR THE YEAR ENDED 30TH SEPT., 1914.

THERE have only been nine meetings held during the year. Two of the summer rambles were cancelled owing to railway excursions being stopped, one of these being the annual joint ramble with the Manchester members, which was to have been held at Silverdale in September. As these joint rambles in the past have been most successful functions, it is disappointing that adverse circumstances caused this one to be cancelled.

Of the three meetings held in the field, the first was at Selby, in April ; the second at Agbrigg, near Wakefield, in May ; and the third at Harewood, in July. All were well attended.

Of the six meetings held during the winter session, three were held in the Cartwright Hall, Bradford, and three in the University, Leeds. The February meeting at Leeds was of special importance, as, in addition to a visit from our Manchester friends, it was made the occasion for presenting the Nelson Collection of mollusca, books, etc., acquired by subscriptions raised through the efforts of this Branch and a Memorial Committee, to the University.

Special exhibits of British species have been continued at our winter meetings, and we are deeply indebted to Mr. J. W. Taylor for his contributions on the life-history, morphology, and distribution of each species. The good attendances show in no uncertain manner the members' high appreciation of Mr. Taylor's addresses.

Many other exhibits of a varied character have been displayed and commented upon by the members.

The meetings of the Yorkshire Naturalists' Union are attended, and records of species kept in our record-book.

The membership at the present time is twenty-two and two corresponding members. Mr. A. Hartley is our President.

F. BOOTH, *Hon. Sec.*

ANNUAL REPORT OF THE LONDON BRANCH.

DURING the past year the London Branch has held eleven meetings. Of these, seven were ordinary meetings, which on the whole were well attended, and at which there were many interesting exhibits. A particularly good series of the genus *Harpa* was shown at the April meeting.

The field meetings were at Headley, Amersham, Wendover, and Coulsdon; they were not so successful as in previous seasons. Two of the later field meetings were abandoned on account of the war.

We are again indebted to Mr. J. C. Dacie for kindly providing a room for the evening meetings.

J. E. COOPER, *Hon. Sec.*

ANNUAL REPORT OF THE NORTH STAFFORDSHIRE BRANCH.

THIS Branch has held two winter meetings, and monthly field meetings during the past year, but owing to the war the work has been considerably interrupted since August last.

The winter meetings were held in the Free Library, Hanley, and at the first meeting most interesting series of *Helix pomatia* and *H. aspersa* were exhibited and the varieties discussed, the Staffordshire specimens of the last-named species being carefully compared with the type and variations noted. At the second winter meeting, large series of *Helix nemoralis* and *H. hortensis* were exhibited by members, and a similar discussion followed.

The monthly field meetings were held at various places in the county, and good series of local species and varieties were collected, including pure white specimens of *Arion ater*, which is not a common variety in the county. The most interesting specimen which turned up was an enormous specimen of *Arion ater* var. *rufa*, and a description of this slug has been submitted for publication in the *Journal*.

B. BRYAN, *Hon. Sec.*

OBITUARY NOTICE.

ALFRED JOHN JUKES-BROWNE, F.R.S., F.G.S.

By J. COSMO MELVILL, M.A., D.Sc., F.L.S.

(Read before the Society, November 11th, 1914).

It was with unfeigned regret that I read in "The Times" in the middle of August last the obituary notice of one with whom I had maintained a voluminous and interesting correspondence for several years. Mr. Jukes-Browne passed away, after a very brief illness, on 14th August, aged 63, at his residence, "Westleigh," Ash-Hill Road, Torquay.

Born near Wolverhampton on 16th April, 1851, son of the late Mr. A. H. Browne, who married Miss C. A. Jukes, known as the authoress of the life of her eminent brother, the geologist, Professor J. Beete Jukes, F.R.S., he inherited a marked leaning first for the science of geology, in which he attained much well-merited fame, and in his later years for the study of a kindred subject, the recent mollusca, notably of the class *Pelecypoda*.

Educated at the famous Cholmeley School at Highgate, Middlesex, and subsequently at St. John's College, Cambridge, he passed the Natural Science Tripos in 1873, and took the degree of B.A.

In the same year he was appointed an assistant, at first temporarily, on the Geological Survey of Great Britain, under Sir Andrew Ramsay, and continued to act till 1901, when, owing to ill-health, he was compelled to retire. Indeed, he was never from early youth very robust, though the strength of his mental powers aided him in apparently overcoming his physical delicacy. And for the last twenty years of his life he was very lame and almost unable to walk.

In 1901 he was awarded the Murchison Medal by the Council of the Geological Society in consideration of his masterly writings on the Upper Cretaceous Rocks, and other services to the cause of the science in this country, and eight years later (1909) he was elected a Fellow of the Royal Society.

His geological papers were voluminous, over one hundred in number, while his separate publications include several standard works, recognised as text-books of proven authority on the subjects with which they deal. Such are :—

- I.—The Student's Handbook of Practical Geology.
- II.—Handbook of Historical Geology.
- III.—Handbook of Stratigraphical Geology.
- IV.—The Building of the British Isles.
- V.—The Cretaceous Rocks of Britain.

As already mentioned, it was comparatively late in life that Jukes-Browne began the study of the recent mollusca in detail, and the list of the following papers shews where the drift of his observations lay, being mainly the study, mostly based on the hinge-formations, of certain families of *Pelecypoda*, notably *Mytilidæ* and *Veneridæ*.

- I.—A Review of the Genera of the Family *Mytilidæ*. Proc. Malac. Soc., Lond., vi., p. 211 (1905).
- II.—The Application of Poli's Generic Names. Ib., viii., p. 99 (1908).
- III.—On the Genera of *Veneridæ* represented in the Cretaceous and Tertiary Deposits. Ib., viii., p. 148 (1908).
- IV.—On the Application of the Names *Gomphina*, *Marcia*, *Hemitapes*, and *Katelsysia*. Ib., viii., p. 233 (1909).
- V.—On *Petricola*, *Lucinopsis*, and the Family *Petricolidæ*. Ib., ix., p. 214 (1910).
- VI.—On the Names used by Bolten and DaCosta for Genera of *Veneridæ*. Ib., ix., p. 241 (1911).
- VII.—The Nomenclature of the *Veneridæ*: A Reply to Dr. W. H. Dall. Ib., x., p. 36 (1912).
- VIII.—The Genus *Dosinia* and Its Subdivisions. Ib., x., p. 95 (1912).
- IX.—On *Dosinia lucinalis* (Lamk.) and Its Synonyms. Ib., x., p. 214 (1912).
- X.—On *Tivela* and *Grateloupia*. Ib., x., p. 266 (1912).
- XI.—On *Callista*, *Amiantis*, and *Pitaria*. Ib., p. 335 (1913).
- XII.—A New Species of *Clementia*.¹ Ann. and Mag. N.H., ser. viii., vol. xi., July 1913.
- XIII.—Note on *Clementia subdiaphana* Cpr. Ann. and Mag. N.H., ser. viii., vol. xiii. (March, 1914), p. 338.
- XIV.—On the Shells known as *Gemma*, *Parastarte*, and *Psephidion*. Ib., vol. xii., p. 473 (Nov., 1913).

I may add that the nomenclature of mollusca was another important subject to which he had devoted considerable time and thought, and he was, for instance, very averse to the resurrection of Bolten's Catalogue names, as he called them.

¹ *C. obliqua* J.Br., afterwards considered by Dr. Dall a variety only of *C. subdiaphana* Cpr. from California.

He had the misfortune to lose both his wife and son in his lifetime, but is survived by his only daughter.

It is, I think, worth while transcribing *in extenso* three letters almost taken at random from his correspondence, written at the time when he was most closely studying the intricacies of the family *Veneridæ*, both to shew his clear, lucid, and attractive style of writing, and the thoroughness with which he encountered and mastered the knotty difficulties and details of any subject he undertook to study.

• Westleigh, Torquay,
January 8, 1913.

DEAR MR. MELVILL :

I have recently been studying the *Callista-Pitaria* group of shells, recent and fossil, with the hope of discriminating more satisfactorily between the proposed genera.

You have shown such kindly interest in my previous studies that I hope I may enlist your interest in this one also. I think I can divide the group into three genera by means of two chief criteria, which are associated with minor points of distinction.

These two points are the position of the left posterior cardinal, which I will write of as L.p.c., and the channel occurring in front of the right anterior cardinal in *Pitaria*, abbreviated as R.a.c.

1.—If you will take a *Callista chione* you will see that the L.p.c. is a short tooth, highest in the middle and confluent with the nymph, while there is no channel leading to the anterior lateral pit in front of the R.a.c.

2.—If you take *Cytherea dione* you will see that it has a long L.p.c., confluent along its whole length with the nymph, and that there is a channel in front of R.a.c.

3.—If you take any *Pitaria* except *P. tumens*, you will see that the L.p.c. is entirely distinct from the nymph and extends to the inner margin of the hinge-plate; while the plate of the R. valve is channeled, as in *C. dione*.

Now Group 1 includes almost all the shells which have generally been called *Callista*. The second is the *Dione* group as restricted by Römer, together with the *Amiantis* of Carpenter, which name it must bear, since *Dione* was preoccupied by Hubner.

The third group comprises most of the *Pitaria* shells, but unfortunately *P. tumens* (the type) is an exception, both in regard to the L.p.c. and the depth of the pallial sinus, a correlative but subsidiary point.

My collection of *Pitaria* is by no means complete, and there are many species which I cannot get from Sowerby; so I should be greatly obliged if you would assist me by looking through your shells to see if you can easily arrange them by my criteria, and whether there are any other species of *Pitaria* (proper) which agree with *P. tumens*, and differ from such species as *P. leta* and var. *obliquata*, *P. citrina*, *P. subpellucida*, *P. varians*, etc.

All the typical *Pitaria* seem to be either smooth or striated with fine concentric lines. Those which are concentrically ribbed like *P. manilla*, *P. inflata*, and the little *P. minuta*, which you sent me from the Gulf of Oman, have the L.p.c., which is characteristic of *Amiantis* (= *Dione*).

Of course the name *Pitaria* must go with the type form (*P. tumens*)—there is no getting out of that, because it was the original “*Pitar*” of Adanson; but I could propose a new name, say *Pitarina*, for those which compose my Group 3. The genus could then remain as *Pitaria*, with a sub-genus *Pitarina*, though in this case the type-form would have to be excluded from the definition.

I do not quite see at present the best way of getting over this difficulty. *P. tumens* is really a link between *Amiantis* and *Pitaria*.

Believe me, Yours very truly,

A. J. JUKES-BROWNE.

Westleigh, Torquay,

January 18, 1913.

DEAR MR. MELVILL:

I appreciate your kindness in sending me so many of your *Pitias*, which duly reached me this morning, having I see been posted yesterday.

I have unpacked them, and find they have travelled without harm. I will go through them carefully, and name as many as I can. At present I will only say that the shells in a glass-topped box, labelled at back *Cytherea exilis* Desh.?, are not that species, but the *Cytherea nitidula* of Lamarck, which is a *Tivela*. I have long been wanting to see this species, which appears to be rare, and comes from the west coast of North America (see Carpenter's List).

Your specimens are odd valves, evidently picked up on the shore, and not found alive.

The three shells labelled “*nitida*, Tasmania,” are the *Venus nitida* of Quoy and Gaim. (= *levigata* Sow., 1835). It is not a *Pitaria*, nor any kind of *Cytherea*, lacking an anterior lateral tooth, but appears to be a *Marcia*, allied to *M. kochii* of South Africa.

Of the others I will write when I have had time to examine them.

Believe me, Yours sincerely,

A. J. JUKES-BROWNE.

Westleigh, Torquay,

February 19, 1913.

DEAR MR. MELVILL:

I am now able to return the second set of shells which you kindly lent me for examination. Some of them were correctly named, but others I have been able to rectify, as you will see from the labels.

I think [*Pitaria*] *lata* and *obliquata* are really varieties of one and the same species, and I don't see much difference between *prora* (Conrad) and *obliquata* (Hanley).

Your Hong-Kong shell is a rather rare form, the *alabastrum* of Sowerby, and I am glad to have seen it.

The shell I have named *pellucida* (Lam.) is certainly the *limatula* (Sow.), but I believe them to be identical; I wrote to Sowerby for both, but he could only send me *limatula*, saying that they could not be sure of *pellucida*. Lamarck's description applies to *limatula*, but is too short, and his shell has never been figured. Römer tries to distinguish between them, but I doubt his accuracy, as it does not appear that he saw the type of either.

There are two pairs of *P. tumida*, but the locality ("Meditn.") of one must be an error.

The two which you query as *P. nana* are identical with two which Sowerby sent me as *manille* (Sow.), and he ought to be right. If he is, then Römer is wrong again, for his *manille* is just like the specimen of yours which I have put in a pill-box. This species—the *manille* of Römer—will have to be renamed.

I have had some correspondence with Smith about *Callocardia*, the result of which is to upset my previous ideas. He will not now admit *birtsi* and *pudicissima* to belong to *Callocardia*, and if they do not I have never seen a *Callocardia*, and his figure of the hinge is quite too poor to depend upon.

Your two shells belong to the *birtsi* group, and seem to be of the same species, but they do not agree with *birtsi* or *pudicissima*, so I cannot name them.

Curiously enough, Mr. McAndrew recently sent me a large shell of the same group to examine, and I sent it on to Smith; but he could not name it, and said it differed from all in the B.M. The group wants investigating.

One of your species is a *Callista*, and three others are *Gomphina*, one of the latter being apparently a new species. You should take it to the B.M. when you next go to London.

The shells have been interesting to work at, and with many thanks,

I remain, Yours very truly,

A. J. JUKES-BROWNE.

EDITORIAL NOTES.

THE Annual Meeting, due to be held last October, was postponed, and the following resolution, passed unanimously at a Special Council Meeting held on Sept. 30th, was affixed to the cover of our October number:—

"That owing to the present circumstances caused by the war the Council deem it fitting to postpone the Annual Meeting, fixed for October, until such time as the President—who is in Australia, and likely to be detained beyond the time fixed for his return—can be communicated with, when, it is suggested, he be requested to retain office for another year."

M. Dautzenberg has recently published a new¹ list of the species of mollusca (recent and fossil) of which a sinistral or dextral monstrosity is on record, the total being 178 sinistral and 17 dextral. To this catalogue we can add two species of which sinistral examples exist in our own collection, viz., *Tritonofusus gracilis* daCosta, and *Marginella diaphana* Kiener, and the *Journal of Conchology* has in past numbers recorded *Helicoluma obvoluta* Müller, *Limnæa glabra* Müller, *Vivipara contracta* Millet, *Limnæa auricularia* L., and *Vertigo substriata* Jeffreys, which are not on M. Dautzenberg's list.

1 Bull. Soc. Zool. de France, vol. 39, p. 50 (1914).

The full catalogue serves to emphasise the extreme rarity of this occurrence amongst marine shells; out of the 170 recent species listed, only 33 are marine, and it is very curious that 15 of the 33 belong to the genus *Marginella*.

Only ten fossil mollusca are known to present this phenomenon, one being a *Helix*; of the 9 marine species 3 are *Marginella*.

The comparative frequency of sinistral *Helix aspersa*, *H. pomatia* and *Buccinum undatum* in collections is no doubt due in great part to the fact that these species are so largely gathered for food, but on the other hand, a sinistral *Littorina littorea* is extraordinarily rare, though we believe that two or three others exist in English collections, as well as the example which M. Dautzenberg believes to be unique.

Reference is made incidentally to a paper on the sinistral form of *Turbinella pyrum* L., the chank shell of the Hindus, by Mr. J. Hornell, Madras Superintendent of Pearl Fisheries. He estimates that some 120 reversed specimens exist in temples in India and Ceylon, where they are considered sacred objects.

One of our members—Mrs. Longstaff—has lately written a very interesting paper on a visit to the Southern Sudân, with a list of the non-marine mollusca collected there, three species being new to science. Mrs. Longstaff ascended the White Nile to Rejâf, which is 1,128 miles from Khartûm, and had numerous opportunities of collecting on or near the river banks. She points out that the geographical position of the Nile, draining as it does the region of the Great Lakes into the Mediterranean, causes a commingling of Ethiopian and Palæarctic forms. Another interesting point is the extraordinary range of certain species on the African continent, especially freshwater species. Thus *Spatha wahlbergi* Krs. occurs from Khartûm to the Transvaal, as well as westward into Nigeria, while the terrestrial *Burtoa nilotica* Pfr. ranges from the Bahr-el-Gebel to Matabeleland, as well as eastward to the River Juba and westward to Lake Tchad.

Altogether 34 species of Gastropods and 19 Pelecypods were obtained.

In the September number (vol. xi., part iii.), of the Proceedings of the Malacological Society, the Rev. E. W. Bowell completes a series of papers on the "Radulæ of British Helicids," with figures, the only species which he has not figured being *Helicella gigaxii* Pfr. and *Vallonia pulchella* Müll. The omission of the latter was due to the writer's inability "to obtain specimens from shells which belonged without doubt to this species."

An excellent paper has just appeared on the genital organs of the Danish species of *Clausilia*, by C. M. Steenberg, with good photographic text-figures and plate. The Danish species are *C. plicatula* Drap., *C. lineolata* Held, *C. bidentata* Ström, *C. dubia* Drap., *C. pumila* Zgl., *C. biplicata* Mont., *C. plicata* Drap., *C. ventricosa* Drap., *C. laminata* Mont., and possibly *C. parvula* Stud. *Balea perversa* is also included. M. Steenberg remarks that the grouping of these *Clausilias* on conchological grounds has been entirely confirmed by anatomical research. He recognises *Clausiliastra*, *Pirotoma*, and *Alinda* as distinct genera.

¹ Journ. Linn. Soc. (Zoology) vol. 32, p. 233 (May, 1914).

² Anatomie des Clausilies Danoises—I., Les Organes Génitaux (Bianco Lunos Bogtrykkeri, Copenhagen).

A paper entitled "Les Mollusques de la Baie de Saint-Malo," by MM. Dautzenberg and Durouchoux, published in the *Feuille des Jeunes Naturalistes*, 1913, is of special interest to British marine conchologists, partly because of the close relationship between the shells of S. Malo and those of the Channel Isles, and partly because of certain points raised in nomenclature. The total number of species from the bay is 238, and the author gives a very large number of named varieties, many of them being merely colour forms. *Donax vittatus* var. *lutea* Martel is antedated by var. *albida* Marshall.

The following are some of the changes in nomenclature proposed: The authors state (1), that Basterot's *Bulla lajonkaireana* is a miocene fossil very different from the long-spined form of *Tornatina obtusa* Mont. to which Jeffreys applied the name var. *lajonkaireana* Bast., and that the latter must be called var. *candidula* Loc. (2), That *Nassa pygmaea* must be called *N. varicosa* Turton, Lamarck's name being preoccupied by Schlotheim. (3), That *Rissoia violacea* Desm. is exclusively Mediterranean, and that our shell which goes by this name must be called *R. lilacina* Récluz. (4), That, as the generic name *Pherusa* is preoccupied, they propose *Marteliella* as a generic name for *Pherusa gulsona* Clark. They appear, however, to have overlooked Norman's name *Pherusina* proposed in lieu of *Pherusa* for this same shell. *Pherusina* seems to occur first in the *Museum Normanianum*, part iv., p. 18 (1888), but as this catalogue was "printed for private distribution" and presumably never on sale, it would not constitute publication. The name, however, was properly published in the Conchological Society's "List of British Marine Mollusca and Brachiopoda," *Journ. of Conch.*, vol. 10, p. 20 (1901), and renders *Marteliella* superfluous. (5), That the shell which we usually call *Gibbula umbilicata* Mont. is daCosta's *Trochus umbilicalis*, the latter being prior both to Montagu's name and to Gmelin's *obliquatus*.

This paper is accompanied by four photographic plates, the species figured being mostly Rissoids and Pyramidellids with which we are familiar on our own coasts.

The following notice has been communicated:—

Manual of the New Zealand Mollusca, with an atlas of quarto plates, by HENRY SUTER; published by the authority of the Government of New Zealand, Wellington, N.Z. John Mackay, Government Printer, 1913; pp. i.—xxiii., 1—1120.

The appearance of this work marks the extraordinary advance made in conchological science at the Antipodes in recent years. When Jeffreys' British Conchology was published no list of New Zealand mollusca was in existence; the first appeared in 1873, the second in 1880, and the present magnificent volume in 1913. Suter notes that in the 1880 Manual 595 species were admitted, but of these 148 have been proved to be exotic, leaving 447 Neozelanic species at that time valid. The present Manual covers 1187 distinct forms, an advance almost beyond the appreciation of a student of Palearctic forms.

The 1187 forms are all described in detail, and as the synopsis given on pp. xvii.—xxiii. shows these to be divided into 164 families and 324 genera, the work of compilation must be regarded as of a monumental nature, for all these higher groupings are diagnosed, in most cases full details of the molluscs being given. When the disabilities of working under Antipodean conditions are considered, nothing but praise can be accorded Mr. Suter upon the completion of such a splendid guide to the Mollusca of New Zealand. It would be easy for one surrounded by the wealth of British Museums, both as regards specimens and litera-

ture, to criticise the details of this work; but such petty criticism as could be offered would savor of hypercriticism and is therefore withheld.

Fairly gauged, this work must be considered one of the most valuable contributions to malacological literature of recent years, and it should be on the book-shelf of every malacologist with more than parochial pretensions. The classification followed is that presented by Pelseneer in his Treatise of Mollusca, and the present writer, having made continual use of that system, would suggest that under the present knowledge of molluscs, it seems the most suitable for general usage. Suter has given keys to genera and species, and consequently the work is very easy to use, and anyone can now name with a full degree of certainty their New Zealand shells. An Atlas of Quarto Plates is promised and when that appears the certainty should be made absolute.

It must be observed that the treatment is rigidly scientific, and the nomenclature quite up-to-date. The only blemish in the work is Suter's rejection of names unaccompanied by a figure; otherwise the nomenclature laws now in force have been faithfully accepted, the Boltenian genera being utilised, though Suter has expressed a personal disapproval of their use.

T. IREDALE.

Large *Arion ater* var. *rufa* and *Testacella scutulum* at Stoke-on-Trent.—

On 25th February I was asked to examine a very large and brightly coloured slug which had been found in a green-house at Stoke-on-Trent. It proved to be a very fine example of *Arion ater* L. var. *rufa* or *rubra*; and when fully extended measured $7\frac{1}{4}$ inches. The colour of the body was a bright reddish-brown, tentacles bluish-black, fringe a very bright red with narrow transverse black lines, foot-sole yellowish-white. On making enquiries of the gardener I was pleased to learn that a species of *Testacella* had frequented the garden for some years past. To assure me of the fact he produced four living *Testacella* which he had obtained a day or two before while digging up celery. I identified them as *Testacella scutulum* Sowby. In the kitchen garden we dug up four or five sticks of celery which still remained, and I picked out from the upturned soil no fewer than eight specimens, all of which proved to be *Testacella scutulum*. I kept these slugs in captivity for some time, and had several opportunities of observing their method of seizing and devouring earth-worms. They took on an average about seven minutes for each worm.—B. BRYAN (*Read before the Society*, May 13th, 1914).

Helicella virgata m. *sinistrorsum* near Scarborough.—On Sept. 5th of this year I found an example of this rarity on the Seamer roadside, three miles from Scarborough, and another specimen was also taken by myself on Sept. 12th, 1914, two miles out of town on the Filey road. Both specimens were of the var. *albicans*, mature, well grown, and otherwise perfect. Four specimens have now been recorded from the immediate neighbourhood of Scarborough, three of them taken by myself, and all being found in the North Riding.—WALTER GYNGELL (*Read before the Society*, Oct. 14th, 1914).

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THE

JOURNAL OF CONCHOLOGY.

VOL. 14.

APRIL, 1915.

No. 10.

NOTE ON *MARGINELLA PERLA* Marrat
and *PUSIONELLA RECURVIROSTRIS* Marrat.

BY J. R. LE B. TOMLIN, M.A.

(Read before the Society, Feb. 6th, 1915).

***Marginella perla* Marrat.**

ON p. 44 of the present volume I gave notes on several species of *Marginella* described by Marrat. At that time the Curator of the Liverpool Museum was unable to find the type of *M. perla*, a species described in the *Journ. of Conch.*, 1, p. 136. He has, however, recently come across it and very kindly forwarded it for my inspection.

It proves to be identical with *M. biplicata* Krauss, described from the Cape in *Archiv für Naturgeschichte*, 1852, p. 37. Watson also described this species as *M. chrysea*, in the "Challenger" Gasteropoda Rep. (1886), from Sea Point, Cape Town, but both his name and Marrat's are long subsequent to that of Krauss. Marrat was unaware of the locality of his specimen.

¹*Pusionella recurvirostris* Marrat.

I have also had an opportunity of comparing the unfigured type of this species with the series of *Pusionella* in the British Museum, and have no doubt that ²Tryon was correct in his surmise as to its identity with *P. aculeiformis* Lam. This species seems subject to very considerable variation in the extent and character of the longitudinal ribbing on the upper whorls, and forms exist with the lower whorls more or less acutely shouldered (³*Fusus catelini* Petit). The dimensions of Marrat's type are—length 32 mm., diam. max. 12 mm.

¹ *Journ. of Conch.*, i, p. 180.² *Man. Conch.*, vi, p. 236.³ *Journ. de Conch.*, ii, p. 75, pl. 1, f. 2.

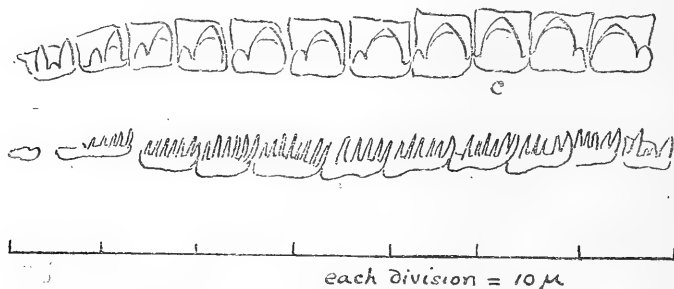
NOTE ON THE RADULA OF PYRAMIDULA RUPESTRIS (Drap.).

By E. W. BOWELL.

(Read before the Society, May 13th, 1914).

A SPECIMEN of this radula is herewith submitted to the Society.

The radula shown was taken from an animal found by the writer on the Great Doward, in the south of Herefordshire, where the species is abundant. Similar specimens have been examined from several localities in the county of Kent. It seems, however, to be a very different form from the one figured in Mr. Taylor's Monograph (vol. iii., pp. 171, 474). The present specimen bears not the slightest resemblance to *P. rotundata*; it is, indeed, very different in appearance from any other of our small Helicids. The only Helicid radula which it recalls is that of *Helix lapicida*, and the resemblance to *lapicida* is less complete than it first appeared to be. The comparison,¹ however, was made with a young specimen of *lapicida*, which naturally possesses fewer admedians, the lateral ones being provided with a distinct ectocone, as are these of *rupestris*, and the externals having subpectinate cones. The specimen shown under the microscope has 204 rows, 8 admedians, and 11 externals. The one photographed has 173 rows, 7 admedians, and 11 externals. Both were adult and contained young; five in the former case, two in the latter. In both cases there was little left of the parental tissues except the radula. The embryonic radulæ are similar in plan to the adult organ, but the admedians, which number two or three only, have more markedly blunt mesocones, not yet produced into pointed cusps. On their external unci, however, the pectinations are rela-



tively longer and finer. The adult specimen shows a broad central mesocone, occupying the whole width of the uncus. The main conic

¹ Proc. Malac. Soc., vol. viii. (1908), p. 126.

portion of this is a rounded and prominent mass, similar to that of *lápida*; it is produced apically into a rather long cusp, the relative size of this being decidedly greater than in *lápida*. The admedians follow the same design, but in these an ectocone gradually appears, reaching its maximum development in the last admedian. In the transitional or first external uncus, mesocone and ectocone are equal in size. The admedian and central unci have subquadrate basal plates, closely apposed and interlocked. The terminal cusps of the mesocones overlap the next row to a considerable extent, but this is only seen in adult specimens. The externals begin somewhat abruptly, the mesocone plus endocone base giving place to an elongated parallel-sided basal plate without apical or alar expansions. From this arise the pectinated cones, in type similar to those found in *Vertigo* and *Pupa*. Their character is established at the third external. The pectinations are usually six on each uncus, but as many as eight may sometimes be seen. They are frequently dissimilar in successive rows.

POSTSCRIPT.—Since the above was written I have, through the kindness of Mr. J. W. Jackson and Mr. E. Collier, been able to examine the radulae of specimens of *P. rupestris* from Tenby (Pembrokeshire), Holker (Lancashire), Silverdale (Lancashire), Ravensdale (Derbyshire), Newmarket (Flint), Miller's Dale (Derbyshire), Castleton (Derbyshire), Arnside (Westmorland), Hungary, Amalfi (Italy), and from another unspecified Italian locality. In every case the radula showed the characteristics of the Herefordshire specimen described above. The specimen from Paignton (Devon) in the Gwatkin Collection in the Manchester Museum is also of the same type.

OBITUARY NOTICE.

JAMES MADISON.

[The following notice is compiled from information very kindly supplied by Mr. P. T. Deakin, of Birmingham].

JAMES Madison, whose membership of our Society dates back to 1884, was born in Birmingham in 1847. Being a delicate boy, he had comparatively little schooling—a thing which was always a matter of great regret to him—but subsequently he made up for much of the loss by attending both elementary and advanced classes at the Birmingham and Midland Institute, and won several prizes.

He also attended classes in his favourite subjects of Botany and Geology.

For many years he followed his father's trade as a shoemaker; later on he worked in an iron warehouse, where the hours were shorter and enabled him to spend more time in the open air.

For the ten years previous to his death he worked on a small estate at Northfield, where his natural taste for gardening enabled him to transform a few small fields into a charming landscape garden.

He was reluctantly compelled by illness to relinquish this work some fourteen months before his death and to move back into the town, and in attempting to do some of the heavy work of the move he overstrained an already weak heart. His strength faded away very gradually, and at the last he only took to his bed for a single day, passing away in his sleep early on January 4th, at the age of 67. He had one brother and two sisters, of whom one sister (who always lived with him) survives. He was unmarried.

A keen observer and an indefatigable field worker, he knew the Midlands pretty thoroughly as well as many out-of-the-way localities much further afield, as he preferred to collect his specimens himself whenever possible.

Botany, Geology, Microscopy, and Photography all came in for a share of his leisure, but Conchology always remained his most favoured study, and notes thereon are scattered through the *Midland Naturalist*, the *Journal of Conchology*, *Science Gossip*, and other periodicals, though his natural unobtrusiveness prevented him from being a voluminous writer.

He will perhaps be best remembered in connection with the discovery of *¹Physa heterostropha* Say living in Britain.

He was an active member of the Birmingham Microscopists' and Naturalists' Union up to quite recently, and also belonged for some years to the Birmingham Natural History and Philosophical Society.

His collections comprised land and freshwater mollusca, British and foreign, and fossil mollusca—chiefly from the Silurian, Liassic, Oolite, Eocene, and Oligocene—the last two groups being gathered during holiday visits to Hants. and the Isle of Wight. The pick of the Eocene and the Oligocene fossils he presented about eighteen months ago to the Birmingham New Museum, and it is hoped that arrangements will now be made to transfer most of his collections—or at least the local part of them—to the Museum.—EDITOR.

¹ *Journ. of Conch.*, ix., p. 152.

A CROSS BETWEEN TYPICAL *HELIX ASPERSA* AND VAR. *EXALBIDA*: ITS RESULTS AND LESSONS.

By A. W. STELFOX, M.R.I.A.

(Read before the Society, Jan. 13th, 1915).

BEFORE conchologists became acquainted with the results of Mendel's experiments, several attempts were made to procure specimens of sinistral shells and other extreme variations by crossing one of these with a typical example of the same species. Unfortunately through lack of knowledge these experiments were only carried to the F₁ generation, in which the aberrant form—being recessive—could not appear. Hence many naturalists came to believe that such forms were "freaks" incapable of transmitting their characteristics to their descendants. I remember well being told by a former president of our Society that the colony of white *Clausilia bidentata* at Kinbane, co. Antrim, could not be due in any way to heredity. I had been reproving him for collecting all the white shells, by suggesting that this might exterminate the colony; but at the time I was quite satisfied with his answer. I know now that he was entirely in the wrong.

Upon finding a specimen of *Helix aspersa* var. *exalbida* near Dorking, Surrey, in September 1911, I determined to keep it for experimental purposes. During the following month it was placed in a box with a more or less typical example taken at Carrickfergus, co. Antrim, in August 1910. Throughout the following experiment the snails were fed on lettuce leaves and slices of carrot or turnip.

In February, 1912, both specimens came out of hibernation and were observed to pair on the following day. No eggs were laid; but they again paired several times and eggs were laid in a burrow in the sand at the bottom of the box during May. By which specimen the eggs were laid I do not know. On the 25th June and following days the young were hatched. They grew quickly and by Xmas 1912 some had reached a diameter of 15mm.; the smallest being about 9mm. in diameter. All hibernated during the winter, most by fastening themselves against the side of the box; some buried themselves in the sand with the mouth of the shell upwards. I was interested to discover the means by which these burrows are excavated; it is, I believe, by using the foot-sole as a "conveyor." First a sort of round depression is made with the head; and then the snail proceeds to walk into the sand. The shell coming in contact with the sand hinders movement, and consequently it is the sand under the snail that travels, being thrown

backwards by the movement of the muscles of the foot. How the animals roll over on their backs before hibernating I have not yet discovered.

The first shell to come from its winter quarters appeared on 2nd February, 1913; but all had not re-awakened till 3rd March. Two of the largest specimens were isolated and attained their full growth during June and July, 1913. They were seen pairing on 14th August; but no eggs were laid during this year. One specimen went into hibernation on 10th October and the other later in the same month.

By this time almost all the F₁ generation were full-grown, although a few did not reach full growth until 1914, and all resembled, more or less, the typical parent from Carrickfergus.

On 1st February, 1914, one specimen came out of hibernation; but not until 30th March did its companion make its reappearance. On 31st March, the following day, they paired and remained thus all day. Again at 7 p.m. on 8th of May they were seen pairing and were still thus at 1-30 p.m. on the following day. Eggs were laid on 3rd June under a flat stone which I had placed on the sand. One parent died on the 12th June: presumably that which had deposited the eggs. About seventy-five young hatched out on 27th June, and many more on the following days. On 15th July another "family" appeared, the outcome of a batch of eggs laid by the remaining parent during June. As soon as growth commenced, it was observable that some of the young shells were of a greenish colour and not of the pale amber hue of the typical form. As the amber coloured specimens grew they developed the normal brown banding and were killed at once to prevent over-crowding. On 14th August the *exalbida* examples were easily distinguished from their pinkish-brown brothers and on that date all specimens were killed but twenty (eleven white and nine brownish) with which I intend to carry on further experiments.

In all 311 examples were reared and assuming that the originals from Dorking and Carrickfergus were each homozygous in regard to their colouring, white and brown respectively, the F₂ generation, theoretically, should have consisted of 77.75 *exalbida* and 233.25 type. The actual figures, therefore, are most interesting, namely 72 white and 239 brown. Several at least died before their colour could be ascertained with certainty and are not included in the figures given. These figures came as a great surprise to me, as I did not expect to get more than a few white examples in the F₂ generation. It is not easy to see how a stray white specimen could be of a pure strain, unless the var. *exalbida* is a homozygous recessive form.

Dr. A. E. Boycott in a recent letter suggests that self and not cross fertilization may be common in the case of *Helix nemoralis*; but up to the present I have seen no evidence that such is the case, although I am carrying out numerous experiments with different coloured forms of that species. The above experiment at any rate is a clear proof of cross fertilization.

In their "List of British Non-Marine Mollusca," published in London, 1914, Messrs. Kennard and Woodward distinguished between "varieties" and "forms." Unfortunately they give no reason for this distinction, nor do they state in what way a "form" is inferior to a "variety." I note, however, that in the case of *Helix aspersa*, vars. *major* and *minor*, auct., are given as "forms," while in the cases of *Helix nemoralis* and *H. hortensis* they rank as "varieties." In the latter species all colour variations, even including *citrinizonata*—which in the West of Ireland frequently occurs in colonies—are regarded as "forms."

Now my experiments have shown me that while the latter variations are hereditary, the size and texture of a shell can be influenced by its food supply, and its general environment during growth. I think, therefore, that such variations as *libellula*, *rubella*, &c., and especially *citrinizonata* are well worthy of the name "variety." Some colour variations of *Helix nemoralis*, in Ireland, have distinct geographical ranges: thus some are "western," some "central," but many, of course, are generally distributed, though few occur throughout the whole range of the species.

EDITORIAL NOTES.

OUR Proceedings for February contain an account of the presentation of an illuminated Address to Mr. John W. Taylor at Manchester, as some slight recognition of his services to Conchology, to the Society and to this *Journal* of which he was the founder. These services are more fully and adequately dealt with in the terms of the Address which we print elsewhere, but it seems only fitting to call attention in this column to the honour so deservedly accorded to our first editor. The meeting was very enthusiastic and congratulatory—alike on the seventieth birthday which Mr. Taylor was celebrating and on the completion of the third volume of his Monograph. For the benefit of those members who could not get to Manchester on February 6th, we are able, through Mr. Taylor's kindness, to offer reproductions of the cover and front page of the Address. We should add that the President of the Society, Mr. R. Bullen Newton, F.G.S., came down from London specially to preside at the meeting.

In the January number the name of the President of the London Branch should be A. E. Salisbury.

Mr. W. Denison Roebuck communicates the following:—"The recent death of Mr. Robert Renton, of Greenlaw, Berwickshire, at the age of 75 years, removes one who contributed materially to the Census of the Mollusca for that county—for which thirty years ago he sent numerous species. He was not a professed conchologist, but according to a brief note in the "Gardeners' Chronicle" for 16th Jan., 1915, p. 36, he was a bryologist of wide reputation, and an entomologist, antiquary, and numismatist of repute."

In the *Irish Naturalist* for last October, vol. xxiii., pp. 205—211, are two short papers with reference to the anatomy of *Vitrina hibernica* Taylor, one by A. E. Boycott, the other by E. W. Bowell. The reproductive organs of this species were first described and figured by Bowell in the *Irish Naturalist* (1908), vol. xvii., p. 94, pl. 4 (under the name of *V. pyrenaica* Fér.), and subsequently by Taylor in his Monograph from Simroth's dissections. These two accounts differed materially in their interpretation of the organs opening into the atrium, and Bowell in his recent paper unhesitatingly admits that in the 1908 paper he interpreted wrongly. Boycott, in the paper mentioned above, from the examination of a complete series of microscopical sections confirms the views of Simroth and Taylor as to the organs in question, but he finds that though the opening of the *vas deferens* into the *penis-sheath* is lateral, as figured and described, yet the *vas deferens* is continued *within* the *penis-sheath* to its distal end, where it opens into the *penis*, thus approximating to the arrangement in *Vitrina pellucida*.

Our congratulations are due to Mr. J. W. Taylor, alike on his seventieth birthday and the recognition thereof by the Society, and on the completion of the third volume of his Monograph with the appearance of part 21 on December 21st. This part contains pp. 481—522 and plates 19 and 28 with index. The text consists of supplementary notes on *H. pomatia*, *H. aspersa*, *H. nemoralis*, *H. hortensis*, *H. pisana*, *H. lapicida* and *H. arbustorum*, a new variety of *H. hortensis* being described under the name of var. *fascialba* Taylor. Text figures are given of additional continental varieties, there is a full list of subscribers, and an additional bibliography. It is satisfactory to note the Public Libraries of 23 towns, and 54 Societies, Museums, or other Institutions amongst the subscribers. Plate xix. contains the British species of *Punctum*, *Pyramidula* and *Helicigona*, while plate xxviii. gives beautiful colour reproductions of 19 forms of *Helix hortensis*. These are up to the very best standard of Mr. Taylor's work.

We understand that all the collection of recent shells formed by the late A. J. Jukes-Browne is bequeathed to the Oxford University Museum. Most of his fossils had been given away many years ago, but the local collection of polished corals from the limestone has gone to the Torquay Natural History Society's Museum.

THE RADULA OF HYALINIA.

III.

The Radular Characteristics of *Hyalinia helvetica* from different localities.

By A. E. BOYCOTT.

(Read before the Society, October 14th, 1914).

IN this paper I propose to describe shortly the results of the examination of the radula of *Hyalinia helvetica* from four different English localities. The specimens were all collected by myself in 1911-1913 at (1) Banstead in Surrey, (2) English Bicknor in West Gloucestershire, (3) Tremadoc in Carnarvonshire, and (4) Marple in Cheshire. All the radulae were prepared and examined in the same way—a point which may turn out to be of some importance. The mean results of enumeration and measurement are given in the following tables, the specimens being classified into size groups in accordance with the conclusions previously reached (this *Journal*, vol. xiv. (1914), p. 214).

TABLE I.

Locality.	Size Group mm.	Number exam.	Diam. of shell mm.	Number of rows	Number of m'rgin'ls	Size of radula.			Ratio length width	Total number of teeth	Area of one tooth μ^2
						Long	Wide	Area			
Banstead	7-7.9	66	7.43	40.98	11.30	2.401	0.528	1.268	4.5	1213	1045
	8-8.9	23	8.34	41.83	11.91	2.590	0.595	1.546	4.4	1287	1201
Bicknor	7-7.9	9	7.54	38.00	10.39	2.283	0.509	1.163	4.5	1055	1098
	8-8.9	11	8.46	40.82	10.91	2.523	0.540	1.370	4.7	1178	1157
	9-9.9	5	9.46	43.60	11.50	2.732	0.571	1.560	4.8	1308	1193
Tremadoc	7-7.9	6	7.50	37.17	11.42	2.320	0.594	1.380	3.9	1108	1244
	8-8.9	10	8.49	38.60	11.90	2.569	0.631	1.622	4.1	1189	1365
	9-9.9	5	9.42	38.60	11.80	2.782	0.651	1.810	4.3	1181	1533
Marple	7-7.9	10	7.56	38.50	10.25	2.342	0.578	1.364	4.0	1057	1278
	8-8.9	10	8.40	37.90	11.25	2.451	0.625	1.569	3.9	1113	1370
	9-9.9	5	9.26	40.40	11.30	2.718	0.662	1.799	4.1	1196	1504

Table II. gives the averages of these mean figures for the 7 and 8 mm. groups, there being no representatives of the 9 mm. group in the Banstead series.

TABLE II.

Locality.	Diam. of shell	Number of rows	Number of m'rgin'ls	Size of radula			Ratio length width	Total number of teeth	Area of one tooth μ^2
				Long	Wide	Area			
Banstead	7.89	41.41	11.589	2.495	0.561	1.407	4.4	1250	1126
Bicknor	8.00	39.41	10.65	2.403	0.525	1.267	4.6	1116	1132
Tremadoc	7.99	37.88	11.66	2.445	0.612	1.501	4.0	1149	1296
Marple	7.98	38.20	10.75	2.397	0.601	1.466	4.0	1085	1332

I have not set out at length the range of variation within each group for each of these particulars, but in general it is similar to the variation in Banstead *helvetica* which has been already described (*supra* p. 232). The number of rows, for example, in the Marple series varies from 36 to 44, from Tremadoc from 36 to 42, from Bicknor from 37 to 43. The number of marginals is $9\frac{1}{2}$ to 12 from Marple, 9 to 13 from Bicknor, 10 to 13 from Tremadoc. The existence of this variability makes it necessary to enquire what degree of difference in the average figures is significant of a real difference between the various groups. The twenty specimens from Bicknor, for example, differ in several particulars from the twenty specimens from Marple, and it is conceivable that if other twenty examples from Bicknor had been examined the results would have agreed with those of the Marple group. Statistical enquiry has, however, discovered certain principles which prevail in the variability of live things, and knowing the variability of these radular properties and taking into consideration the number of specimens examined, we can state approximately the difference which must be present between two averages before we can regard it as indicative of a respectable distinction. The necessary differences in the present case are roughly as follows: number of rows 2.0, number of marginals 0.8, length of radula 0.2 mm., width 0.05 mm., area 0.2 sq. mm., total teeth 90. Borderline cases, of course, occur in which the presence of any real difference is doubtful. The Marple *helvetica* accordingly have fewer rows than the Banstead specimens, but not necessarily more than those from Tremadoc or less than those from Bicknor; the Tremadoc *helvetica* correspondingly have fewer rows than those from Banstead and probably less than those from Bicknor, but the average does not differ from the Marple average by an amount large enough to be regarded as significant.

TABLE III.

Locality.	Number of rows	Number of m'rgin'ls	Total number of teeth	Size of radula		
				Long	Wide	Area
Banstead compared with Bicknor	more	more	more	...	more	more (?)
" " Tremadoc	more	...	more	...	less (?)	...
" " Marple	more	more	more	...	less (?)	...
Bicknor compared with Tremadoc	more (?)	less	...	...	less	less
" " Marple	...	...	...	...	less	less (?)
" " Banstead	less	less	less	...	less	less (?)
Tremadoc compared with Marple	...	more	more (?)	...	...	...
" " Banstead	less	...	less	...	more	...
" " Bicknor	less (?)	more	..	...	more	more
Marple compared with Banstead	less	less	less	...	more (?)	...
" " Bicknor	...	...	...	..	more	more (?)
" " Tremadoc	...	less	less (?)	...	...	...

Interpreting the results along these lines we arrive at the following characteristics by which each local series may be differentiated from each of the others. Cases which are queried are probably rather than certainly distinct. Cases which are left blank show no significant difference, but it should be remembered that the degree of difference necessary for significance varies with the number of specimens examined and it by no means follows that the measurement of longer series would not reveal distinctions where, on the present evidence, they cannot be said to exist.¹

It is evident that there are one or more particulars in which each series differs from the others. On the whole Banstead is most and Marple least divergent from the general run. Tremadoc and Marple are nearest one another. Banstead and especially Bicknor have narrow radulæ, and Bicknor a generally small organ. Banstead has the greatest number of rows with many marginals and hence a large number of teeth, which, as the radula is not conspicuously large, are rather small.

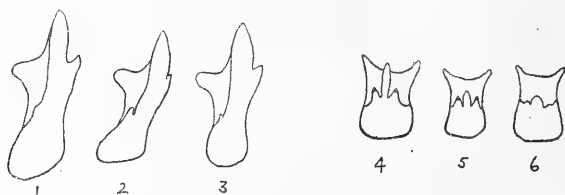
The configuration of the variable teeth (*i.e.*, the third lateral and first marginal) also shows some local variation. The cutting points may in a general way be regarded as falling into three categories of development and to each may be assigned a numerical value. They may be absent ($=0$), small or imperfect ($=0.5$) or fully developed ($=1$). For example, in the eleven specimens in the 8 mm. group from Bicknor the endocone of the third lateral tooth is absent in one, small in 7, and well-developed in 3, giving a total of $0 + 3.5 + 3 = 6.5$ marks out of a possible total of 11, or 60 per cent. This figure of 60 may be taken as representing approximately the degree of development of that cutting point in that particular series of specimens. The calculation is obviously based partly on fact and partly on one's personal interpretation of the significance of "small." The "figures of merit" for the present series are:

TABLE IV.

		Endocone 3rd lateral		Ectocone 3rd lateral		Endocone 1st marginal
Tremadoc	7-8.9 mm.	52	.....	31	.....	0
	9-9.9 mm.	70	... ..	60	... ..	0
Bicknor	7-8.9 mm.	57	.....	47	.....	0
	9-9.9 mm.	75	.....	65	.....	0
Marple	7-8.9 mm.	55	.....	27	.....	1
	9-9.9 mm.	75	... ..	45	.....	0
Banstead	7-8.9 mm.	90	.....	42	.....	4

1. In the present state of our knowledge one has to restrict each series to those collected at one time over quite a small area of ground in order to exclude time and locality factors which have not yet been examined. Hence it is not always easy to secure adequate series of the appropriate sizes.

The outstanding features here are the high development of the endocone, and to some extent of the ectocone, of the third lateral in the Banstead specimens with which is associated the occasional presence of a small endocone on the first marginal. This last occurred, and then only as a trace on one side of the radula, in only one of the 71 specimens from elsewhere. This is the more significant as these included much larger individuals than the Banstead series and, as was pointed out in my more detailed study of these specimens (*supra* p. 218), this differentiation of the first marginal tooth increases as the shell grows larger. This growth change is well shown in the figures



for the third lateral tooth from Tremadoc, Bicknor and Marple, but it is less advanced than in the smaller Banstead specimens and practically never extends to the first marginal tooth. There also seems to be a relative failure in development of the ectocone of the third lateral tooth in the Marple specimens.

With the alternative notation which was previously used (*supra* p. 235), we get the following figures for the percentage occurrence of each type of tooth in the 7 and 8 mm. series for the third lateral tooth :

TABLE V.

	Type I.	Type II.	Type III.	Type IV.	Type V.	Type VI.
Banstead	0	12	9	13	54	12
Bicknor	0	10	62	0	23	5
Tremadoc	0	38	56	3	3	0
Marple	6	35	39	0	20	0

These figures bring out equally well the greater differentiation of the Banstead specimens.

Two other features of the cutting points require notice. (1) The Tremadoc specimens alone showed, in five individuals, the curious condition known as "truncation of the mesocone" of the central tooth, which seems to be actually a failure of development of the highly refractile cutting point. In four this involved the mesocone only (figure 5), the lateral cusps being fairly normal (figure 4); in a fifth example (figure 6) the lateral cutting points were also absent. (2) Five of the Bicknor specimens had a form of elementary ectocone to the third lateral tooth which I have not seen elsewhere. The

ectocone is represented by a well marked fold and notch but the tip of the cusp thus formed has no refractile cutting point. The condition is represented in figure 2 and is evidently different from the more usual shoulder (figure 1) or small ectocone with a cutting point (figure 3). The common abnormalities of *Hyalinia* radula—bifid cones—occurred in five of the whole 160 specimens.

Some mention is required of the characters of the snails and their shells from which these radulæ came. In no case from an examination of the living animal have I had the slightest doubt that I was dealing with the species commonly known as *helvetica*. The external appearance of this species when alive and active seems to me to be highly characteristic and exceptionally uniform,* compared with *e.g.*, *cellaria*, and to a less degree *alliaria*. Careful observation of live specimens crawling about is, I think, of special importance in *Hyalinia*. Generally speaking the four series present no differences which seem of much importance. In the shell the Tremadoc and Bicknor specimens are thinner than those from Banstead and Marple, especially the former which were difficult to collect and deal with without breaking a good number. They came from a slaty rock, the Bicknor specimens from limestone. The Tremadoc group is further distinguished by a narrower umbilicus¹; the mouth is also relatively higher and the columellar margin more vertical than in Marple and Bicknor specimens in which the mouth is narrower and set more obliquely. The Banstead series agrees more with those from Tremadoc. The white about the umbilicus is best developed in the Banstead series and is practically absent in those from Tremadoc. The spire in the Tremadoc group is flatter than in the others. Such are the differences which by our present methods of examination are qualitative only in character. Definite measurements give the impression of greater uniformity. The average dimensions which are susceptible to fairly easy and tolerably accurate evaluation are given in Table VI. in terms of the major diameter. The shells are those in the 7 and 8 mm. groups in each series.²

TABLE VI.

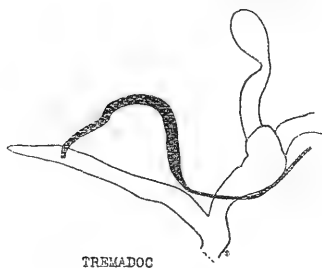
Locality		Major diameter		Minor diameter		Major altitude		Minor altitude		Number of whorls
Banstead	...	100	...	88	...	53	...	35	...	4.8
Marple	...	100	...	87	...	55	...	36	...	4.7
Bicknor	...	100	...	89	...	55	...	36	...	4.9
Tremadoc	...	100	...	88	...	54	...	35	...	4.7

The differences of conoidity, closeness of whorls, relative size of last whorl, etc., are evidently not very great, though the method of

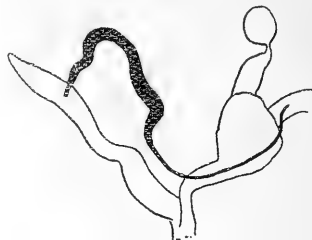
1 Large specimens everywhere seem to have a relatively wider umbilicus.

2 There is no obvious growth change in these figures. The 6 mm. group of Banstead *helvetica* gives 100, 90, 53, 35; the 5 mm. group 190, 89, 51, 34; the 4 mm. group 100, 89, 52, 35.

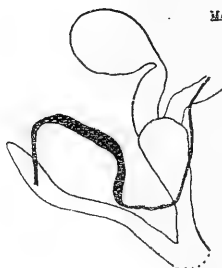
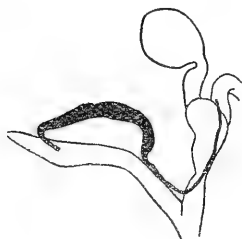
comparison is one of considerable delicacy.¹ Relatively speaking the Banstead shells are flatter, the Bicknor most closely coiled (the



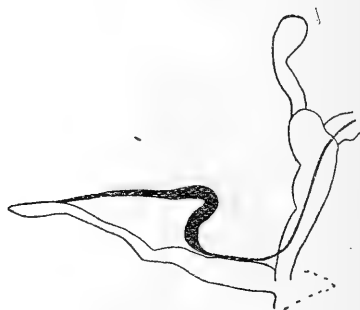
TREMADOC



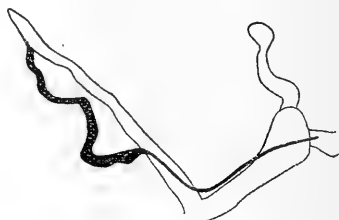
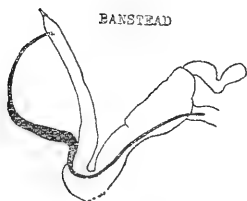
MARPLE



BANSTEAD



BICKNOR



difference being in the arrangement of the apex), while the Marple specimens have the most rapidly expanding last whorl (*i.e.*, the difference between major and minor diameter is greater).

1. In illustration of the results a series of *cellaria* from Banstead 7.8'9 mm. in diameter give 100, 88, 48, 32, with 4.7 whorls: the figures bring out the relative flatness of *cellaria* clearly enough.

Anatomically I could find no very important differences. To say that they would have been demonstrated if the whole of the organs had been examined quantitatively as has the radula, is to express a mere opinion. The only point to which attention should be drawn is the exceptional length of the penis in the Bicknor specimens. This is shown in the figure which gives camera lucida outlines of the lower parts of the genitalia of two specimens from each locality, all prepared in the same way from shells between 8 and 9 mm. in diameter and magnified to the same degree. To the other differences shown in the figures I should attach no importance.

We have then here specimens of *Hyalinia helvetica* from four widely separated localities. Each series has some rather ill-marked shell characters and some well-marked radular characters, and it would be consonant with one attitude towards such problems to elevate some or all of them to nominal rank. Such a course has the clear and definite advantage that it would focus attention, controversial or acquisitive, upon the group and thus lead pretty quickly to a desirable amplification of our knowledge. But before taking such a step further information is wanted along three lines—(1) As to whether *helvetica* from any two localities are identical when judged by the criteria here adopted. (2) Whether the variation here described is local or familial. As it happens each series was collected from a very circumscribed locality, a good deal less than fifty yards square in every case. The results, therefore, do not throw any light on the question whether, e.g., the Marple individuals are fairly representative of the *helvetica* living in the Marple valley or whether their characteristics are confined to the particular colony from which they came.¹ It is a common habit of *helvetica* to live in rather definite colonies, like *lucida*, and not with the general dispersion of *cellaria* or *nitidula*, and this mode of occurrence (which, by the way, does not hold at all in the Banstead district of Surrey) is, perhaps, provocative of the development of local characters. (3) Whether the characteristics found are permanent in the sense that they continue unaltered in any one colony over a period of years. Whatever the answer to these questions may be, it is obvious that radular characters may prove of considerable value in the differentiation of local races and that local variation in the radula must be taken into account in the consideration of "specific differences."

SUMMARY.

The radulæ of *Hy. helvetica* from four localities (Surrey, Gloucestershire, Cheshire and Carnarvonshire) are described and found to have characteristic features in each case.

¹ The specimens dealt with here came from the well-known spot by the aqueduct to which Mr. Standen directed my attention.

A FURTHER NOTE ON PIGMENTATION IN *HELICELLA GIGAXII*.

BY A. E. BOYCOTT AND J. WILFRID JACKSON.

(Read before the Society, Jan. 13th, 1915).

IN answer to our request for live specimens of *H. gigaxii* (antea p. 167), we have received the following lots:—

No. 1.—Hudnall Common, near Berkhamsted, Herts. From Mr. C. Oldham. A small form, of drab colour; some distinctly banded, especially below the periphery; others with broken bands, small blotches or flames; a few entirely bandless (=var. *lutescens*, Kendall). From this locality Mr. Oldham has also recently described some specimens as var. *hyalozonata*. Average diameter=7mm.

No. 2.—Little Tring, Herts. From Mr. C. Oldham. A slightly larger form, showing the same variation in colour and marking as No. 1, and including vars. *hyalozonata* and *alba* of Oldham. Average diameter=8mm.

No. 3.—Wendover, Bucks. From Mr. C. Oldham. A larger form, banded and blotched as No. 1; also vars. *lutescens*, Kendall, and *hyalozonata*, Oldham. Average diameter=10 mm. (Largest specimen=12mm.).

No. 4.—Ayton Road, near Scarborough. From Mr. Hargreaves. A medium-sized form, banded, blotched, and unicolorous (var. *lutescens*). Average diameter=8·5 to 9mm.

No. 5.—Portsdown Hill, Hants. From Mr. H. Beeston. A very small form, comprising white shells (like var. *alba*, Oldham); whitish shells with dark apex (like var. *albicans*, Kendall); whitish shells minutely and sparsely speckled or blotched, sometimes banded below the periphery. This is a remarkably small form and quite full-grown. The average diameter=6·5 to 7; largest=8·9mm.. Mr. Beeston writes, "they never grow any larger. The habitat is among the very short grass on the highest and driest parts of the downs, and in dry weather they are almost indistinguishable from the tiny pieces of white chalk."

In the above five lots the pigmentation of the genitalia previously found to be characteristic of the *H. gigaxii* from Prestatyn was present, *i.e.* the neck of the dart-sac and the lower part of the duct of the spermatheca were darkly pigmented, the latter being often black. Lot 5 were examined pretty thoroughly, but no clear difference from the others could be made out; the mucous glands were more voluminous and bulbous, but their precise shape and arrangement is variable.

Lots 1-4, agree exactly in shell-sculpture, etc., with the typical *H. gigaxii*; lot 5, however, is quite unlike that species in its shell characters, and one cannot feel satisfied as to its specific identity. The characteristic eccentricity of the umbilicus of *H. gigaxii* is wanting, and the shells have more the characters of *very finely striated H. candidula*.

The following specimens of *H. caperata* were also examined:—Portsdown Hill, Hants, same source as lot 5; Horn Head, Donegal, from Mr. Stelfox—his “large western” form.

Both these series were quite free from pigmentation of the parts mentioned, as in the original Prestatyn specimens.



Littorina littorea (L.) : a doubtful record.—In an article by Mr. C. G. Hewitt, which appeared in Ann. Scott. Nat. Hist. Edinb., 1907, No. 64, p. 219, it was stated that at St. Kilda *Littorina littorea* occurred living in the crevices of the rocks at the top of Ruadval, almost 450 feet above sea level. Its presence there was explained by the “almost constant presence of spray from the Dun passage.” As *L. littorea* is a shell whose usual habitat is at and below half-tide mark, such an occurrence appeared very remarkable. I, therefore, wrote to Mr. Hewitt, who is now in Canada, pointing out this fact, and asking him whether he was sure that his shells were not *L. rudis* Mat. He replied that he had no interest in the taxonomic side of the Mollusca, and that, if he desired the name of any particular shell, he was in the habit of applying to Mr. Standen or to one of the other assistants at the Manchester Museum. Neither Mr. Standen nor any of his assistants have any recollection of having seen or named any such specimens, and I am assured that no reference appears on their register to any *Littorina* from St. Kilda. Under these circumstances it is evident that the record cannot stand. The matter may seem of trivial importance, but when the economics of the shore Mollusca come to be better studied, as they will be some day, it is important that we should have none but well authenticated facts to work upon. The present record, if it were left uncorrected, might give rise to mistaken views with regard to the possibilities of life of the species in question. Even as relating to *L. rudis*, it would be remarkable. But that is quite another matter.—A. H. COOKE (*Read before the Society*, Jan. 13th, 1915).

Note on *Helix hortensis* var. *fascialba* Taylor.—In 1912 I was collecting *H. hortensis* from plentiful colonies in the hedges round Barnham, Sussex (West). The majority of the specimens were normal five-banded or bandless yellow; but I took three specimens of *fascialba* Taylor. All three were 00300 in banding, the white zone extending slightly beyond the dark banding both above and below. In every case the form was of the *incarnata* colouring, and it is perhaps noteworthy that while the other specimens were uniformly bandless yellow or type, these isolated specimens from a widely extended area all showed a combination of *incarnata* colouring, 00300 banding and the atavic white peripheral zone.—J. E. A. JOLLIFFE (*Read before the Society*, Feb. 6th, 1915).

WHITE VARIETIES OF *HELICELLA GIGAXII*.

By CHARLES OLDHAM.

(Read before the Society, December 9th, 1914).

IN speaking of *Helicella gigaxii* I assume that the shell which Mr. A. W. Stelfox (Proc. Mal. Soc., vol. x., p. 39) identifies with *Helicella heripensis* (Mabille) is really referable to the *Helix gigaxii* of Charpentier. This species, whatever view systematists may ultimately take of its identity, is abundant on the Chilterns on the borders of Hertfordshire and Buckinghamshire, and during the autumn of 1914 I collected several albine specimens in that district. Most of them had translucent bands or streaks, but at Little Tring I took half-a-dozen which lacked shell-markings. These albine shells indeed corresponded respectively with the typical form and with forms devoid of markings such as the vars. *lutescens* and *albicans* of Kendall, but were entirely without pigment. The pigmented forms are separated according to the presence or absence of bands or other markings, and the albine forms may with propriety be distinguished on the same grounds. I propose the name *alba* for the immaculate, and *hyalozonata* for the banded or streaked form, and append a brief description of each.

var. *alba*—Shell pure white, apex translucent, markings absent or only represented by a few minute and irregularly scattered translucent spots representing the minute coloured specks which are often present in pigmented shells. Locality, Little Tring, Herts.

var. *hyalozonata*—Shell pure white, apex and shell markings, whether bands, mottlings or transverse streaks, translucent. Localities, Wendover, Bucks.; Little Tring, canal-bank near Tring station, and Hudnall Common, Herts.



Reversed *Helix aspersa* in Carnarvonshire.—I found a living adult example of the monst. *sinistrum* of *Helix aspersa* on the cliffs at Porth Oer near Aberdaron on October 2nd, 1914. Although the occurrence of such abnormalities may have no distributional significance, it is perhaps well that they should be recorded.—CHAS. OLDHAM (Read before the Society, Dec. 9th, 1914).

THE MARINE MOLLUSCA OF SÃO THOMÉ, II.
Descriptions of a New Genus and Five New Species.

BY J. R. LE B. TOMLIN, M.A., AND L. J. SHACKLEFORD.
(PLATE V.).

(Read before the Society, Feb. 6th, 1915).

¹**Tropidorissoia** gen. nov.

THIS name is proposed for a group of Rissoids which seems confined to the islands off the West Coast of Africa, the type species selected being *T. taphrodes*, Tomlin & Shackleford, described below.

They are small conical shells of four to five whorls, with a varying number of more or less prominent spiral keels which continue almost or quite to the apex (*cf.* ²Smith on *Riss. platia*), the interspaces being smooth, and with much rounded apertures.

We should assign to *Tropidorissoia* the following S. Helena species ³described by Mr. E. A. Smith, viz. *Rissoa aequa*, *R. platia*, *R. wallichi*, *R. perfecta*, *R. varicifera*, and probably *R. vaga* and *R. simulans*.

Tropidorissoia taphrodes sp. nov. (pl. 5, f. 5).

Shell minute, conical, strongly carinate, slightly rimate or perforate, smooth, solid, light brown in colour, somewhat shining; whorls 5, protoconch smooth and of the same colour as the rest of the shell; the last whorl has three keels, one in the middle of the whorl, and, of the other two, one above and one below at about equal distances from the central keel, which is rather more prominent than the upper and lower ones; the keels are very well marked, massive and completely rounded; the other whorls each have two keels; the last whorl occupies about half the shell; suture indistinct; aperture almost round; peristome acute; columella slightly arched, reflexed.

Long.: 1·5 mm.; diam. max. 1 mm.

Hab.: S. Thomé, not very common.

The type specimen is the only one that we received in a live state.

This curious little species, which we make the type of a new genus, is only comparable with certain S. Helena species already mentioned.

¹ τρόπις—a keel.

² P.Z.S., 1890, p. 309.

³ *ibid.* pp. 288-290.

⁴ ταφρώδης=trench-like.

It is most nearly related to *T. aequa* (Smith), and *T. perfecta* (Smith), but is at once known by its three keels on the body-whorl, whereas *T. aequa* has seven, and *T. perfecta* five.

Leiostraca¹ diauges sp. nov. (pl. 5, f. 6).

Shell subulate, straight, smooth, polished, imperforate, transparent, the axis being plainly visible through the shell; colour white with somewhat irregular and interrupted brownish yellow banding, which starts immediately below the apex; whorls nine to ten, flat with inconspicuous suture; protoconch smooth and yellowish; on the last three, sometimes the last four whorls there are two irregular, much interrupted, often slightly oblique bands of a brownish yellow colour, with some irregular marks of the same colour towards the base of the body whorl; on the upper whorls there is a single, more continuous band, which on the first three or four whorls is practically sutural; aperture narrow, short, pyriform, extremely acute above; columella slightly arcuate.

Long.: 4 mm.; diam. max. 1.4 mm.

Hab.: S. Thomé, rare.

Syrnola thomensis sp. nov. (pl. 5, f. 2).

Shell elongate, fusiform, smooth, polished, shining, imperforate, white, somewhat opaque; whorls eleven to twelve, with smooth, heterostrophe apex, the diameter of the last whorl being rather less than that of the penultimate; suture strongly incised, showing this feature very clearly in the outline of the shell; aperture elongate oval, rather small, one-tenth of the total length of the shell; columella with a strong plait.

Long.: 11 mm.; diam. max. 1.5 mm.

Hab.: S. Thomé, scarce, in coral gravel.

This species is very similar in general appearance and proportions to *Syrnola aciculina* (Souv.) from New Caledonia and Lifu (as *S. jaculum* Melv. and St.), but it increases rather more abruptly in breadth and has its greatest diameter at the penultimate, instead of at the last whorl. The aperture is much smaller than in *aciculina*.

From *Syrnola gracillima* Smith (Whydah) it differs in its more swollen appearance with tapering apical whorls; the Whydah species is almost straight-sided.

Odostomia² pithus sp. nov. (pl. 5, f. 4).

Shell ovate, pupiform, smooth, semitransparent, white, rather dull, imperforate; whorls seven to eight, very slightly convex, taper-

¹ διαυγής=transparent.

² πίθος=wine-jar.

ing very little and increasing very slowly in size, with heterostrophe, yellowish apex, the last whorl being about twice the size of the preceding and less than half that of the whole shell; suture somewhat impressed; aperture ovate, moderately acuminate above, about two-fifths the length of the shell; peristome acute; columella reflexed, almost straight with a strong plait on the lower part.

Long.: 3.5 mm.; diam. max. 1.5 mm.

Hab.: S. Thomé, not common, in coral gravel.

This *Odostomia*, though very ordinary in appearance, we cannot identify with any described species.

It is akin to *O. rissoides* Hanley in size and general appearance, but differs in being imperforate, less conical, less impressed at the suture, and it has the plait or tooth lower down the columella.

Turbonilla ¹pyrgidium sp. nov. (pl. 5, f. 3).

Shell small, narrow, very strongly turreted, longitudinally ribbed, without spiral sculpture, white, shining, transparent, imperforate; whorls eight to nine, strongly keeled on the upper part near the suture and flattened above the keel; with smooth, heterostrophe apex; the longitudinal ribs, of which there appear to be about twenty-four on the body whorl, are strongly marked on the upper part of each whorl and form a series of beads where they cross the keel, but on the lower part are evanescent; columella arcuate, without a visible plait; aperture small, roundly oval.

Long.: 3 mm.; diam. max. .35 mm.

Hab.: S. Thomé, moderately common.

This beautiful little shell, which is well represented by the figure, is quite unlike any other species with which we are acquainted. Owing to the filmy texture of the shell, it is extremely difficult to count the number of ribs.

All the type specimens are in the British Museum.

Note on *Turbonilla phrikalea* Watson.—On plate 5, fig. 1, of this number I give a figure of a *Turbonilla* which is not uncommon in the S. Thomé coral gravel, and which I have no hesitation in identifying with the above species. Watson described it ("Challenger" *Gasteropoda*, p. 493) from a single worn broken example, dredged at station 24, off Culebra Island. The colour, which he does not mention, varies from dark to light fulvous brown. Watson spells the specific name differently on the plate, but *phrikalea* is correct according to the derivation he gives.—J. R. LE B. TOMLIN (*Read before the Society*, March 10th, 1915).

¹ *πυργιδίον* = little tower.

CENSUS AUTHENTICATIONS.

BY W. DENISON ROEBUCK, F.L.S., HON. RECORDER.

ALL the records here given are based upon examples submitted to the official authenticators: myself for slugs only; Mr. Fred Taylor for *Paludestrinidæ*; and Mr. John W. Taylor for all other species.

Berkshire: *Planorbis fontanus* found sparingly in pond in oak wood on Bucklebury Common, 23rd June, 1914, by Mr. Anthony J. Arkell.

Bucks.: Mr. Charles Oldham has submitted numerous examples of *Helicella heripensis* from The Hale, Wendover, and from Aston Clinton, all taken 25th October, 1914.

Carmarthenshire: Mr. J. Williams Vaughan has submitted a few examples of *Paludestrina jenkinsi* taken 22nd May, 1913, in a small stream behind Kidwelly Castle, in company with *Limnæa truncatula*, *Pisidium obtusale* and abundance of *P. cinereum* (*casertanum* of Woodward).

Carnarvonshire: Mr. Charles Oldham has sent two *Vallonia excentrica*, taken at Rhiw, 3rd October, 1914.

Channel Isles: *Hygromia granulata*, Guernsey, R. Rimmer, numerous. Small specimens are in the Royal Scottish Museum at Edinburgh.

Cheviotland: Mr. A. M. Oliver sent examples of *Planorbis albus*, *Anodonta anatina* and *Pisidium amnicum* taken in June and July, 1910, all of which are plentiful in the River Coquet near Warkworth—particularly on the south side.

Cornwall East: *Vallonia costata*, one specimen from Fowey, collected by R. Rimmer, is in the Royal Scottish Museum at Edinburgh.

Denbighshire: *Helicigona lapicida*, one from Llandulas (J. R. le B. Tomlin), and a few from Great Orme's Head (Alfred J. Nixon). *Clausilia laminata*, one from Llangollen (A. O. W[alker]). *Asca tridens*, several var. *nouletiana* from the Great Orme, Llandudno, 1887 (J. R. le B. Tomlin), and numerous examples, mostly var. *alzenensis* from Llandudno, 1887 (Id.). All these are in the Grosvenor Museum at Chester.

Devon South: Of *Limnæa stagnalis* var. *fragilis* and *Limnæa glabra* a few not quite full-grown, both labelled "South Devon, R. Rimmer"; and of *Acanthinula aculeata* from Dartmouth, two, 1877, R. Rimmer; specimens are in the Royal Scottish Museum at Edinburgh.

Donegal West: Mr. R. Standen has submitted *Pupa cylindræa*, which was abundant at Portsalon in May, 1893. The collection of Mr. Standen and Mr. Jackson contains three examples of *Planorbis glaber* taken by Mr. Standen in Ballymagahy Lough in May, 1893; and a few *Sphærium corneum* taken by him in the same month in water-holes on the golf-links at Portsalon.

Dumbartonshire: A few examples of *Ena obscura*, collected in 1888 near Dumbarton by Mr. A. Shaw, are in the collection of Mr. Standen and Mr. Jackson.

Dumfries-shire: In the Royal Scottish Museum at Edinburgh are numerous examples of *Sphyradium edentulum* collected in 1880 at Lodge Wood, Dalawoodie; two of *Vertigo substriata* Moffat, 1882; one juvenile specimen of *Hyalinia helvetica* from the banks of the Cluden, near saw-mills in September, 1880; and a few juvenile *Valvata piscinalis* from the River Cluden just below Dalawoodie in 1880, all collected by the late Mr. Richard Rimmer, whose whole collections were given to the Museum by his daughter.

Ebudes Mid: Mr. William Evans, F.R.S.E., has sent a couple of examples of *Valvata piscinalis* var. *acuminata*, *Planorbis glaber* and a young *Succinea putris*, along with other species, gathered November, 1913, on the margin of a loch in Tiree.

Essex N.: Numerous specimens of *Paludestrina ventrosa* and one *Phytia myosotis* from ditches above Dovercourt (Harwich) railway station, collected by R. Rimmer, are in the Royal Scottish Museum at Edinburgh.

Glamorganshire: Mr. J. Davy Dean sends the following—*Punctum pygmaeum*, two from Castell Coch, Cardiff, taken April, 1914; *Acicula lineata*, two from the same locality; *Cæcilioides acicula*, one from the East Moors, Cardiff, taken in May, 1914; *Pupa muscorum*, several from Sully, including one var. *elongata*, July, 1914.

Haddingtonshire: Mr. W. Evans has submitted *Pisidium amnicum* taken in the Tyne near East Linton, 13th May, 1911.

Herefordshire: In 1910 Mr. N. G. Hadden submitted from the parish of Earls Croome *Punctum pygmaeum*, *Acanthinula aculeata*, *Carychium minimum*, all of which are abundant, *Vallonia costata*, not uncommon, *Vertigo pusilla*, rare (only five examples), *Cæcilioides acicula*, very rare (only one), and *Valvata cristata*, abundant in one ditch only. He also sent an example of *Agriolimax laevis* from Severn Stoke.

Herts.: Mr. Charles Oldham has sent *Helicella heripensis* from Little Tring (numerous, 1st November, 1914), canal-bank near Tring Station (numerous, 8th November, 1914), and Hudnall Common (numerous, 17th October, 1914).

Kent East: Capt. W. J. Farrer sent examples of *Planorbis glaber* from Herne Bay, where in February, 1911, he found it common on caddis-cases.

Kerry South: In the collection of Mr. Standen and Mr. Jackson are numerous examples of *Carychium minimum* taken in July, 1898, in Mucksna Wood, Kenmare.

Kirkcudbrightshire: In the Royal Scottish Museum, Edinburgh, are single examples of *Helicigona arbustorum* type, from Mabie; *Hyalinia radiatula* from Mabie Marthronn, 8th May, 1889; and *Vertigo pygmaea* from Glen Burn, August, 1893; all collected by the late Richard Rimmer. In the Kelvingrove Museum at Glasgow are examples of *Planorbis carinatus* (juvenile), *Helicella virgata* and *H. acuta*, all labelled taken at New Galloway by the late David Robertson. The last-named needs confirmation, as New Galloway is far inland.

Leicester-with-Rutland: Mr. Thos. W. Saunders sent a batch of various slugs collected in the vicinity of Melton Mowbray, on the 18th of March, 1914, which included two new records, viz.: *Milax gagates* var. *rava*, a few nearly grown, and one almost black, and *Agriolimax laevis*.

Limerick: Mr. Harry Fogerty has submitted several examples of *Ena obscura*, taken at Adair, 21st July, 1912. He has also sent Ballinacurra examples of

Punctum pygmaeum, *Acicula lineata*, *Vallonia pulchella*, *Anodonta cygnea* var. *arenaria* from Coolen Lough, Dromore, *Acanthinula lamellata* from Dromore Wood, *Helicella virgata* in its transparently banded white form from Askeaton, and *Phytia myosotis* from Foynes.

Co. Meath: Mr. A. W. Stelfox has submitted a small example of *Vitrina hibernica*, taken 14th July, 1914, on the Meath bank of the Mattock river, near Mellifont Abbey, thus completing the Census for the species.

Monmouthshire: Mr. George Shrubsole has sent a large number of *Hyalinia lucida* from Newport.

Northumberland South: Mr. A. M. Oliver has sent a few *Carychium minimum* from above Corbridge, taken 3rd September, 1910, to establish a more precise record than "Newcastle," on which the Census previously rested.

Nottinghamshire: Specimens from Mattersey of *Segmentina lineata* were taken in May, 1910, by Mr. W. E. Brady. Prof. J. W. Carr has submitted *Paludestrina jenkinsi*, found in a ditch which receives the overflow from the canal at Wollaton.

Pembrokeshire: Mr. J. Williams Vaughan has submitted a few *Pisidium nitidum* and two small *Planorbis fontanus* taken 23rd May, 1913, in a pool near Hoyle's Mouth, Tenby; several *Pisidium subtruncatum* from Manorbier stream, near the sea, 24th May, 1913; and one example of *Punctum pygmaeum* found in moss from near Tenby, same date.

Mr. George Shrubsole has sent a number of mollusca collected at Tenby in 1909, which includes an example of *Hyalinia radiatula*, a desired confirmation of its occurrence.

Ross West: A few each of *Pisidium obtusale* and *P. nitidum*, collected at Gairloch by the late Dr. McMurtrie are in the Royal Scottish Museum at Edinburgh.

Shropshire: Mr. N. G. Hadden has submitted *Clausilia rolfhii* and *Cl. laminata* taken in Linley Woods. They were exhibited at the Conchological Society's meeting on 11th December, 1912.

Somerset North: Miss Agnes Fry sent a nearly adult *Limax maximus* var. *fasciata* from Failand, near Bristol, on the 13th September, 1913.

Wight, Isle of: Mr. Frank Morey sent *Limax maximus*, type, two a third-grown and one *L. flavus*, type, half-grown, from a timber-yard at Newport, 21st November, 1913, on an unbarked oak-log. On the 1st of March, 1914, he found a few *Arion circumscriptus*, juvenile, and one immature var. *neustriaca*, in a wood at Shanklin.

Wilts. South: The collection of Mr. Standen and Mr. Jackson contains several examples of *Pupa secale* from Devizes. Mr. C. P. Hurst, of Great Bedwyn, sent a number of young examples of *Succinea elegans* taken in the first week of May, 1912, amongst herbage on the south side of the Kennet and Avon Canal near that place.

Yorkshire North-East: Mr. J. Kidson Taylor has submitted several examples of *Planorbis glaber* from Scarborough. Mr. J. A. Hargreaves has submitted *Pisidium amnicum* from the River Derwent at Forge Valley, Scarborough.

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN & IRELAND.

437th Meeting, held at the Museum, Manchester, Dec. 9th, 1914.

Mr. E. Collier in the chair.

Additions to Library announced and thanks voted:—

“Littoral Marine Mollusks of Chincoteague Island, Virginia,” by J. B. Henderson and P. Bartsch.

“A New Pearly Freshwater Mussel of the Genus *Hyria* from Brazil,” by L. S. Frierson.

“Report on Land and Freshwater Mollusca observed in Hertfordshire in 1908 and 1909”; “id., 1910”; “id., 1911”; “id., 1912,” by Charles Oldham—(from the respective authors); and the usual periodicals received in exchange.

Donations to Cabinet announced and thanks voted:—

By Mr. A. J. Arkell (per the Hon. Recorder):—*Planorbis fontanus*, from Bucklebury Common, Bradfield, Berks., June 23rd, 1914.

By Mr. Charles Oldham:—A fine sinistral *Helix aspersa*, and a beautifully mounted series of the Carnarvonshire shells illustrating his papers.

Papers Read.

“White Varieties of *Helicella gigaxii*,” by Charles Oldham.

“Reversed *Helix aspersa* in Carnarvonshire,” by Charles Oldham.

“Conchological Notes from Chili and Brazil,” by Lionel E. Adams, B.A.

“List of Mollusca collected by Lionel E. Adams, B.A., during a Recent Journey in Chili and Brazil, with Descriptions of Six New Species,” by H. B. Preston, F.Z.S.

Exhibits.

By Mr. Lionel E. Adams:—A series of marine shells from Peru, etc., to illustrate his paper; also some beautiful photographs of the scenery, taken by himself, showing the wild character of the country where the specimens had been collected.

By Mr. A. W. Stelfox (per Prof. Boycott):—*Helix nemoralis* × *hortensis* parents and their assumed hybrid progeny; the latter are decidedly *nemoralis* in darts, mucous glands, etc.

By the Rev. Lewis J. Shackelford:—A collection of Australian and Tasmanian species of *Marginella*, including amongst others many of the more recently described—*M. agapeta* Wats. var.; *M. allporti* Ten.-Wds.; *M. altilabra* May; *M. angasi* Braz.; *M. beddomei* Pett.; *M. cratericula* Tate and May; *M. cypræoides* Ten.-Wds.; *M. connectans* May; *M. dentiens* May; *M. diplostrepta* May; *M. findersi* Prit. and Gat.; *M. gabrieli* May; *M. gatliffi* May; *M. geminata* Hedley; *M. hedleyi* May; *M. inequidens* May; *M. indiscreta* May; *M. inconspicua* Rve., and var.; *M. kembiensis* Hedley; *M. mayi* Tate; *M. ovulum* Sow.; *M. stanislaus* Ten.-Wds.; *M. subbulbosa* Tate; *M. schoutanica* May; *M. stilla* Hedley; *M. tridentata* Tate; and *M. vercoi* May. The following were also exhibited:—*M. eburnea* Preston, from Ceylon; *M. gruvelli* Bavay, co-types and specimens just recorded from Mossamedes, Angola.

In the Special Exhibit of the Genus *Ranella*, an almost complete series of the known species was shown. Mr. C. H. Moore gave an interesting description of the more remarkable features of some of the species, together with details of their life-history so far as it is known. An interesting discussion followed.

It was decided to have the following **Special Exhibits** at future meetings:—

January 13th	-	The Genus <i>Buliminus</i> .
February 6th	-	Types of <i>Unionida</i> .
March 10th	-	The Genus <i>Harpa</i>

438th Meeting, held at the Museum, Manchester, Jan. 13th, 1915.

Mr. E. Collier in the chair.

The Hon. Librarian reported that the usual exchanges had been received; also Part 21 of Taylor's "Monograph."

Candidates Proposed for Membership.

C. M. Steenberg, Mag.Sc., Royal Observatory, Ostervoldgade 3, Copenhagen, K. (introduced by H. Overton and W. E. Collinge).

J. Digby Firth, F.L.S., F.E.S., Boys' Modern School, Leeds (introduced by W. Denison Roebuck and John W. Taylor).

Members Deceased.

W. Cash, F.G.S., F.R.M.S.

Dr. H. Strebel.

James Madison.

Papers Read.

"A Further Note on Pigmentation in *Helicella gigaxii*," by A. E. Boycott and J. Wilfrid Jackson.

"*Littorina littorea* (L.), a Doubtful Record," by the Rev. Dr. A. H. Cooke.

"A Cross between Typical *Helix aspersa* and var. *exalbida*—Its Results and Lessons," by A. W. Stelfox.

"Further Additions to the Land and Freshwater Mollusca of Jura, Colonsay, with Oronsay, and Islay," by J. F. Musham.

"Additions to the Land and Freshwater Mollusca of Wigtownshire in 1909," by J. F. Musham.

Exhibits.

By Mrs. Gill: A series of the smaller forms of *Cassis*, including *C. vibex*, *C. testiculus*, etc., illustrating growth and variation.

By Mr. G. C. Spence: A series of *Alcadia*; and a specimen from Jamaica approaching *Brachypodella* (*Mychostoma*) *agnusiana* C. B. Ad., and *diminuta* "Ad." Pils. Externally similar to these but more tapering. The internal column, however, consists of two twisted cords, gradually thickening as they approach the base. Possibly a new species.

By Mr. A. W. Stelfox: Series of specimens illustrating his paper.

By Messrs. Boycott and Jackson: Series of specimens illustrating their paper.

In the Special Exhibit of *Buliminus*, Mr. E. Collier exhibited a very fine series, illustrating twelve of the fourteen sections into which this group is divided. He also briefly outlined their habits and distribution.

439th Meeting, held at the Museum, Manchester, Feb. 6th, 1915. (Special Meeting).

The President, Mr. R. Bullen Newton, F.G.S., in the chair.

Among those present were Messrs. E. Collier, W. Denison Roebuck, R. Standen, J. W. Taylor, A. E. Boycott, B. R. Lucas, J. R. le B. Tomlin, G. C. Spence, C. Oldham, W. H. Hutton, J. R. Hardy, Greevz Fysher, J. E. Crowther, E. R. Brown, F. Booth, W. M. Tattersall, A. Hartley, Mr. and Mrs. G. H.

Taylor, F. Rhodes, H. Maltby, R. Harrison, J. Digby Firth, C. H. Moore, T. Stringer, W. H. Western, T. H. Platt, T. Castle, J. W. Carter, H. L. Stephenson, F. Ashwell, Capt. W. J. Farrer, Mr. and Mrs. Gill, Mr. and Mrs. J. W. Jackson, and Rev. L. J. Shackleford.

Donations to Cabinet.

By Mr. W. Denison Roebuck: *Schizoglossa novoseelandica* Pfr. (one) from Toko, North Island, N.Z., the type locality for the animal and genus (received from R. Murdoch, 1904). *Athoracophorus bilentaculatus* Q. & G., (three), from S. John Hills, Wanganui. The donor remarked on the perfect resemblance of the latter slug to a brown decayed leaf, with veins and sinuosities of outline. It has no shield; the breathing orifice is in the middle of the anterior portion of the back.

New Members Elected.

C. M. Steenberg, Mag. Sc.

J. Digby Firth, F.L.S., F.E.S.

Candidates Proposed for Membership.

Sidney Ash, 8, Gladstone Terrace, Gateshead-on-Tyne.

Percy Thomas Deakin, 19, Digbeth, Birmingham.

Papers Read.

"Note on *Helix nemoralis* var. *fasciata* Taylor," by J. E. A. Jolliffe.

"The Marine Mollusca of S. Thomé, II.—Descriptions of a New Genus and Five New Species," by J. R. le B. Tomlin, M.A., and L. J. Shackleford.

"Note on *Marginella perla* Marrat and *Pusionella recurvirostris* Marrat," by J. R. le B. Tomlin, M.A.

"Land Mollusca of the Weymouth District," by J. E. A. Jolliffe.

"A List of the Recent Species of *Spondylus* Linné, with some Notes and Descriptions of Six New Forms," by Hugh C. Fulton.

Exhibits.

By Mr. G. C. Spence: *Eucalodium*; *Holospira*, including *H. goniotoma* Pfr.; *Obba* and allied forms; co-types of *Brachypodella insulecygni* Clapp.

By Rev. L. J. Shackleford: *Voluta concinna* Brod., from Japan; *V. kingi* Cox, from Bass Straits.

By Mr. E. Collier: *Limnæa stagnalis* from many localities; *Buliminus*.

By Mr. J. Ray Hardy: *Dipsas herculea* from Japan; and selection of exotic *Unionidæ*.

By Mr. Thos. H. Platt: Typical examples of *Unionidæ* from Africa, North and South America, and China—*Truncilla triquetra* Raf., Dick River, Ohio; *T. sulcata* Lea, Ohio; *Quadrula lachrymosa* Lea, Ohio; *Q. metanevra* Raf., Quachita River, Arkansas; *Q. cylindrica* Say, Arkansas; *Lampsilis alatus* Say, Mississippi; *L. rectus* Lk., Mississippi; *Symphynota complanata* Barnes, Ohio; *Unio spinosus* Lea, Georgia; *Dromus dromus* Lea, Tennessee; *Plagiola securis* Lea, Arkansas; *Obliquaria reflexa* Raf., Arkansas; *Gonidea angulata* Lea, California; *Carunculina texasensis* Lea, Arkansas; *Pleurobema asopus* Green, Kankakee River, U.S.A.; *P. clava* Lk., Tennessee; *Arcidens confragosus* Say, Indiana; *Cyprogenia irrorata* Lea, Ohio; *Tritogonia tuberculata* Barnes, Ohio; *Alasmidonta undulata* Say, Orange Co., U.S.A.; *Hyria corrugata* Lk., Brazil; *Prisodon symmatophorus*, Meuschen, Brazil; *Tetraplodon ambiguus* (Lam.), Sowb. Uruguay; *Hyriopsis bialatus* Simpson, Singapore; *Nodularia grayana* Lea, China; *N.*

douglasia Gray, China; *N. caffer* Krauss, Algoa Bay, South Africa; *Pseudospatha tanganyicensis* Smith, Lake Tanganyika; *Grandiditeria burtoni* Woodward, Lake Tanganyika.

By Mrs. Gill:—*Unio*, *Anodonta*, and allied genera; *Tellina radiata* from Bahamas, Barbados, Bermuda, Cayman Brac, Cuba and Antilles; *T. elegans*, Gulf of Mexico.

By Mr. J. W. Jackson: Fossil *Unionide*, on behalf of himself and the Manchester Museum. The series included the type specimens of *Unio kendalli* J. W. Jackson, the earliest true *Unio*, from the Lower Estuarine Series, Saltwick, Whitley, Yorks; Capt. Brown's type specimens of *Unio humatus* and *Alasmodon vetustus* from the Upper Estuarine Series, Grinstead, Yorks.; various species of *Unio* from Wealden beds, near Hastings; and a fine specimen of *Archanodonta jukesii* from the Upper Old Red Sandstone, Kiltoran, Kilkenny.

By Mr. J. R. le B. Tomlin: The type specimens and drawings of five new marine species from S. Thomé; some rare species of *Marginella*, including *M. eltrina* Sow., *M. annulata* Rve., *M. cessaci* Rochebr., *M. bavayi* Dautz., *M. gloriosa* Jous., *M. fischeri* Pall., *M. hirasei* Bavay, *M. fulminata* Kien., *M. trincta* Hinds, *M. bazini* Jous., *M. deliciosa* Bavay, *M. pulvis* Jous., *M. pachia* Wats., *M. elata* Wats., *M. brachia* Wats., *M. anxia* Hedley, *M. lata* Jous., *M. guilloini* Petit, and *M. triplicata* Gask.; and a number of the less common species of *Buliminus*, including *B. pharangensis* Fruhst., *B. porrectus* Milff., *B. featheri* Tomlin, *B. spratti* Pfr., *B. colonus* Milff., *B. humanicolu* Gred., *B. selayerensis* Smith, *B. gausnicus* Gred., *B. boothi* Tomlin, *B. boivini* Mor., *B. loewii* Ph., *B. hyemalis* Heude, *B. szechenyi* Bttg., *Stenogyropsis potanini* Milff., and numerous species of the *Ovella* section.

By the Manchester Museum: Shells of the Hawaiian Islands; *Partula*; *Amphidromus*; *Harpa*; *Anostoma*; *Acavus*; *Papuina*; *Unionide* of Lakes Tanganyika and Nyassa; the "Lodder Collection" of Tasmanian mollusca; and *Unionide* from the "R. D. Darbishire Collection." The general collections exhibited in the shell gallery were open to inspection, and also the special exhibits of *Spondylus*, *Xenophora*, Boring Mollusca, Shell sections, Edible Mollusca, etc., in the side gallery.

The principal business of this Special Meeting, held in lieu of the ordinary February Meeting, was the

PRESENTATION OF AN ILLUMINATED ADDRESS

to Mr. John W. Taylor on attaining his seventieth birthday.

The President of the Society, who had come specially from London for the occasion, made the presentation in the following words:—

"We have assembled to-day to offer our heartiest congratulations to Mr. John W. Taylor on having attained his seventieth birthday. I venture to think that the occasion should also be utilized for offering this gentleman our deepest homage and respect as one of the leaders of conchological science in this country, especially in connection with the study of the British Land and Freshwater Shells, which he has so successfully pursued during the greater part of his career. Mr. Taylor's published researches form numer-

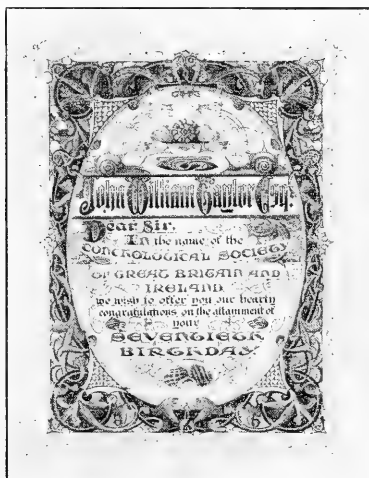
ous papers in the serial literature of our science, and his great work, "**The Monograph of the Land and Freshwater Mollusca of the British Isles**"—of which three volumes are now completed—will for ever place him in the front rank of English conchologists. This monograph is of considerable magnitude, each volume extending to nearly five hundred pages of text, besides being profusely illustrated with coloured plates, text figures, and valuable distribution maps—a very monument of industry and application. We trust that Mr. Taylor's energies will long be with him, so that he may be enabled to finish so important a monograph.

But, apart from his great researches, Mr. Taylor's name will be always associated with the history of our Society as its founder. Starting as a Leeds institution some forty or more years ago, the Conchological Society, with its present home in Manchester, has issued a valuable Journal during that long period, the early volumes of which were edited by Mr. Taylor. Mr. Taylor may well be proud of his Society, which, besides being the senior one of its kind in this country, has done and is doing such excellent work towards inculcating a love for the study of molluscan science."

Mr. Taylor, who spoke with considerable emotion, acknowledged this unexpected recognition of his services to the Society and to Conchology in general, in a felicitous speech.



Reduced copy of the outer cover
of the Address.



Reduced copy of the illuminated
title-page of the Address.

The address, which is the work of Messrs. Oliver of Manchester, is tastefully and brilliantly illuminated, with figures of characteristic shells freely and appropriately introduced; it is bound in book form, in dark green morocco, and runs as follows:

"TO JOHN WILLIAM TAYLOR, ESQ.

Dear Sir:

In the name of the Conchological Society of Great Britain and Ireland we wish to offer you our hearty congratulations on the attainment of your seventieth birthday.

For many years you have devoted your energies towards elucidating the many problems connected with the life-history and distribution of British Non-Marine Mollusca, and it is forty-one years ago that your enthusiasm and enterprise led you to undertake the publication of "**The Quarterly Journal of Conchology**," which has done so much to stimulate and encourage the study of conchology. From the publication of this Journal sprang the Conchological Society, and at this, its 439th meeting, we are rejoiced to be able to greet you as one of our founders, and to recognise the debt which we owe to you as our constant friend and supporter.

The experience gained by your researches, coupled with your artistic and literary attainments, have fully qualified you for the arduous and exacting task of publishing "**A Monograph of the Land and Freshwater Mollusca of the British Isles**," a work which will always stand as a monument to your profound knowledge of the subject, and to the sacrifices which you have ever been ready to make for the promotion of the study.

Conchologists have learned from your example the necessity of minute observation and precise description of our local fauna. In recent years you have also shown that the detailed and accurate examination of the land mollusca may suggest and exemplify theories of high importance in general biology, and we welcome the widespread acceptance of your views upon "**Dominance in Nature**" as a signal testimony to the importance of the study of conchology.

It is our earnest wish that you may long be spared to continue your investigations and to complete the monumental work upon which you are engaged."

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C. H. MOORE.

6th February, 1915.

440th Meeting, held at the Museum, Manchester, March 10th, 1915.

Mr. E. Collier in the chair.

Additions to the Library announced and thanks voted:—

"On some Generic Names first mentioned in the "Conchological Illustrations," by William Healey Dall. "A List of the Land and Freshwater Mollusca of the Dingle Promontory," by A. W. Stelfox (*from the respective authors*); and the usual periodicals received in exchange.

New Members Elected.

Sidney Ash.

Percy Thomas Deakin.

Papers Read.

"Note on *Tellina splendida* of Anton," by Edgar A. Smith, I.S.O.

"The Nomenclature of British Marine Mollusca," by Tom Iredale.

"Notes on the recent species of the Genus *Harpa* Lam.," by J. C. Melvill, M.A., D.Sc., F.L.S.

"Note on *Turbonilla phrikalea* Watson from São Thomé," by J. R. le B. Tomlin, M.A., F.E.S.

Exhibits.

By Mrs. Gill: *Strigilla splendida* (Anton) from West Africa, and *Strigilla tomlini* E. A. Smith from Philippines, Queensland, etc.

By Dr. A. E. Boycott: Mount of about 200 *Clausilia bidentata*, all collected from about one square yard of wall at Portmadoc, showing the normal range of variation and the frequency of the different sizes. The shells ranged from 9½ mm. to 13½ mm., with a mean of 11.35 mm.

By Mr. T. H. Platt: A series of co-types of a new species of *Fusconaia* found by the Rev. H. E. Wheeler, in Cache River, Nemo, Craighead County, Arkansas, U.S.A. This shell, which Mr. Wheeler has named *Fusconaia selecta*, is closely related to *F. undata* Barnes, *F. rubiginosa* Lea, *F. cerina* and *F. hebetata* Conrad, but differs from these in various shell measurements, by which it can readily be distinguished. An excellent description of this splendid shell is to be found in "The Nautilus," for November, 1914. *F. undata* Barnes and *F. rubiginosa* Lea were also exhibited.

The Special Exhibit of the Meeting was the Genus *Harpa*, and specimens were shown by Mrs. Gill, Mr. C. H. Moore, and Mr. J. C. Melvill, who exhibited the specimen of *H. costata* L., figured by Reeve in Conch. Icon., *Harpa*, pl. 2, f. 5. It possesses thirty-eight to forty ribs without flaw or break of any kind, and is probably as fine an example as there is in existence.

The Manchester Museum also exhibited a very fine series of specimens, chiefly from the "Darbshire collection," also fossil examples of *Harpidae*, viz.: *Harpa mutua* Lam. and *Cryptochorda buccinoides* Herm., both from the Middle Eocene of the Paris Basin.

It was decided to have the following **Special Exhibits** at the next three meetings:

April 14th	-	<i>Cyclonassa</i> (= <i>Cyclops</i>).
May 12th	-	<i>Papuina</i> .
June 9th	-	<i>Marginella</i> .

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DR. BOYCOTT would be very grateful for live specimens of *A. lamellata* for
anatomical investigation.—17, Loom Lane, Radlett.

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purchase. Correspondents wanted in Australia and New Zealand.—**J. R.**
LE B. TOMLIN, Lakefoot, Reading.

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VOL. 14.

JULY, 1915.

NO. 11.

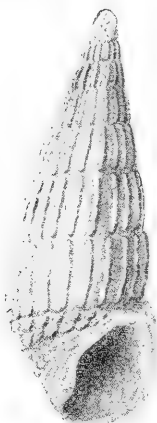
DESCRIPTION OF A NEW RISSOINA.

BY J. R. LE B. TOMLIN, M.A.

(Read before the Society, June 9th, 1915).

Rissoina ¹miltazona sp. nov.—

Shell regularly subulate, solid, shining, white, with a broad brown band encircling the lower part of each whorl, and sometimes an additional fine brown line on the last whorl below the band; apex strongly subulate; suture strongly impressed; whorls 9 to 10, much flattened, protoconch consisting of two whorls, which are smooth and glassy, third whorl smooth with a prominent keel in the centre (visible, however, only in very fresh specimens), the others strongly ribbed longitudinally; there are



Rissoina miltozona sp. nov.

about twenty ribs on the basal whorl, all extending right to the margin, and about eighteen on the penultimate; the basal whorl

¹ μιλτός = red.

is also strongly and distantly spirally grooved at equal intervals with six spiral lines, which cut across the longitudinals so as to form beads; the small area at the base of the canal has also traces of spiral sculpture, and three spirals can sometimes be faintly traced on the penultimate whorl; under a 1-inch objective on the microscope all the interstitial surface is seen to be extremely finely spirally striate, except the protoconch; aperture irregularly pyriform and very small, having a distinct canal; columella strongly arcuate; peristome stout and strong, but not perceptibly thickened, with three raised lines within the lip.

Long., 4.25 mm.; diam. max., 1.5 mm.; diam. max. of aperture, .75 mm.

The type specimen figured is from Lifu. It has been deposited in the British Museum of Natural History. It has been perforated on the side figured by some boring animal, but was selected as the type as best showing sculpture and protoconch.

Hab. I have seen specimens from Naro (Masbate Island), Bagac, and Banacalan (Marinduque Island), all collected by Quadras; Hawaii (Thaanum), Mauritius, and Lifu. Kermadecs and Lord Howe Island, scarce (Iredale).

This species may be Pease's *Rissoina costulata*, described as follows:—

"Shell elongate, fusiform, slender, longitudinally prominently ribbed, striate transversely; whorls flatly convex; suture deeply impressed, grooved; aperture very small, ovate; white, encircled by a chestnut-brown band on middle of whorls.

Long., 5 mm.; diam., 2 mm.

Locality: Paumotus."

The figure is utterly unrecognisable, but the small mouth seems distinctive. Fortunately the question of this identity is immaterial, as the specific name *costulata* is pre-occupied in *Rissoina* by *R. costulata* Dkr. from Japan.

It is a common shell in the Lifu shingle, and may be the form referred to by ³Melville and Standen under *R. nesiotes* as a tubercled variety of that species. Mr. Iredale, who has been good enough to examine the series in the British Museum for me, tells me that a set of *R. nesiotes* Melv. and Stand. (ex Manchester Museum) includes one *R. miltozona*, and that a set of three *R. exasperata* Souv. (ex Sowerby and Fulton) consists of two *R. miltozona* and one *R. exasperata*.

1 *American Journ. of Conch.*, iii. (1857). p. 295. pl. 24, f. 28.

2 *Mal. Blatt.*, vi. (1860), p. 235.

3 *Journ. of Conch.*, viii., p. 307.

DESCRIPTION OF A NEW VARIETY OF
CYPRÆA VARIOLARIA Lamk.

BY JAMES COSMO MELVILL, D.Sc., AND ROBERT STANDEN.

(Read before the Society, April 14th, 1915).

C. variolaria Lamarck, var. **amiges** nov.—

Shell somewhat incrassate laterally, and broadened, normally shaped, the labial teeth strong, fourteen in number, the columellar dentition feeble and thin, not far extending over the base, as is the general case with the allied *C. caurica* and most of its varieties. Whole substance of shell subpellucid, dorsally bright stramineous, with shade of ochre, the usual typical pattern much obscured, and hardly determinable without a lens, when the round clear spots, so characteristic of the species are observable, *C. caurica* never possessing them.

Long. 40, lat. 26 mm.

We have seen only one example of this beautiful form, which stands in relation to the type precisely as the var. *straminea* does to *C. erosa* L., and var. *hawaiiensis* to *C. helvola* L., and we are indebted to Mr. J. Kidson Taylor for first calling our attention to its affinity with *C. variolaria*.

We agree with Mr. H. O. N. Shaw in adopting the name *variolaria* Lam. instead of the well-known *cruenta* Gmel.; he first quotes Dr. J. G. Hidalgo² in saying that this latter name, as adopted generally, was bestowed on the wrong species, for Gmelin signalized *C. erronea* L. as his *cruenta*, this name being, of course, thus rendered synonymic, and therefore, by the rules of nomenclature, not allowed again to come into use. *C. chinensis*, another name of Gmelin's, is now adopted by Hidalgo,³ but the original description is so vague that it seems best to discard it in favour of a name often used for this species preferentially by authors, of which the description is good and decisive. The varietal name is the Greek ἀμυγής, a word used by Aristotle, expressive of clearness and purity.

The unique specimen is in the collection of R. Standen. The locality is not exactly known. The type is found, however, in the Hawaiian Archipelago and it is, therefore, quite possible this variety came from thence, so many species of the genus found in those regions being of the same pellucidity and bright dorsal colouration.

¹ Proc. Malac. Soc., viii., p. 294 (1909).

² Hidalgo: "Cypræa," p. 174.

³ Hidalgo: "Cypræa," p. 307.

ADDITIONS TO "BRITISH CONCHOLOGY."

BY J. T. MARSHALL.

PART VII. (*continued from p. 213*).

***Haliotis tuberculata* L.**—The first whorls of the young *Haliotis* shells are imperforate; when three lines in length they have four imperforate and four perforate eyelets.

In addition to the imperforate specimen, $1\frac{1}{4}$ in. in length, contained in the collection of Miss Lukis (not in that of her sister, Mrs. Collings of Sark, recorded in error by Gwyn Jeffreys),¹ another smaller one has been recorded from the shell beach of Herm,² and another is in the Natural History Museum, measuring $2\frac{1}{4}$ in.,³ while a foreign specimen is on record that has no perforations at all, or any indications of them.⁴ A still more remarkable example of *Haliotis* is recorded by Mr. Edgar Smith, namely a foreign specimen in the Natural History Museum which has a double row of perforations.⁵ It is probable that all these aberrations from the normal form are not very rare, but may not have been noticed.

Even in mature specimens of *H. tuberculata* the number of these perforations is most irregular, some examples having double the number of others. Gwyn Jeffreys states that the number of "orifices is six to eight" . . . "the number of orifices corresponds with the tubular folds of the mantle,"⁶ and that they "are closed after ceasing to be of use in containing the pallial folds." (p. 276).

In Brittany and Normandy the peasantry call the *Haliotis* "Six-Eyes," and although that is about the average number of perforations, plenty of specimens may be found with the number of "eyes" ranging from four to eight. Young naturalists should be told that of course these so-called "eyes" have no connection with the organs of vision.

H. tuberculata is occasionally poisonous. During one of my visits to Jersey some years ago, one of the principal doctors in the island, also my sister, and various other persons, were rendered very ill from eating them. On inquiry, I could only attribute the cause to these *Haliotis* having consumed some starfish, which live in the same habitat under stones, starfish being well known to possess poisonous attributes. There have been numerous instances of ordinary illness following the consumption of these molluscs, but they were all trace-

¹ Brit. Conch., vol. iii., p. 281.

² Marquand, *Journ. of Conch.*, 1904, vol. xi., p. 48.

³ Smith, *Conchologist*, vol. ii., p. 75.

⁴ Kelsey, "A Peculiar *Haliotis*," *Nautilus*, 1904, vol. xviii., p. 67.

⁵ Ann. Mag. N. Hist., ser. vi., vol. i., p. 419.

⁶ Brit. Conch., vol. iii., p. 280.

able to indigestion, more or less acute, and mostly caused by insufficient cooking, of which they require an inordinate amount. When well pounded and sufficiently cooked, however, they make a really savoury dish. They should first be browned in a pan, and then gently stewed. I have eaten them on numerous occasions, but never once experienced any discomfort.

Haliotis are most prolific, and attain a large size, on an extensive barrier group of rocks and islets, called the Minquiers, which are situated between Jersey and France, and about twenty miles from the former coast. Here at low tide hundreds of acres of rocky ground are exposed, and yield a rich harvest to the ormering parties; while a marine naturalist, following in their wake, could not fail to reap a large reward from the number of stones they leave upturned. These ormering parties are taken to the group by a small steamer, only once or twice in the early spring (February and March), at a time when I have never been in the island to seize the opportunity of accompanying them, much as I have wished to explore this group. It is on these island reefs that *Triton cutaceus* and *T. nodiferus* would be most likely to be met with should these species still survive in our seas.

Pearly excrescences frequently occur in the shell of *H. tuberculata*, but loose pearls of any value are very rare, although two fine pearls of a regular shape, and weighing about two grains apiece, have been taken from a Jersey ormer.

While on the subject of pearls, it is a remarkable thing that the Shetland seas should be comparatively rich in seed pearls, though whence they are derived I cannot conjecture. The first and most obvious suggestion is that they are voided by *Ostrea* and *Mytilus*, but these species occur everywhere, and while I do not remember having found a single pearl in any other dredging, on the other hand I have never worked out a Shetland dredging without gleaning some seed pearls. A possible explanation may be that in the Shetland seas the oyster or the mussel is infested with parasitic larvæ, which is now considered to be largely responsible for the valuable pearls of Ceylon, a scientific examination of which has revealed the fact that cestode larvæ form their nucleus. It is only fair to add, however, that the parasitic theory of pearl formation is not uncontested.

Scissurella crispata Flem.—Mull of Cantire, 19-55f. (Knight)! off Fair Isle (Simpson)! off Loch Ryan, 25f., and North Rona, 24f. Also Straits of Korea, 41f. ('Sylvia')!

Mölleria lævigata Jeff.—Between the Shetlands and the Faroes (Simpson)!

M. costulata Möll.—Off Fair Isle, ? fossil; and off the Flugga

Light, N. Shetlands, ? fossil (Simpson)! off Loch Ryan, 28f., ? fossil (J.T.M.). Undoubted recent specimens have been dredged by the Scottish Fishery Board off the Shetlands in 111f. and 155f. (Simpson)!

A specimen of *M. basistriata* Jeff. has been dredged off the Shetlands in 155f., and two specimens between the Orkneys and the Faroes (Simpson)!

A fresh but dead specimen of *Olivia otaviana* Cant. has been dredged between the Orkneys and the Shetlands in 145f. (Simpson)!

Trochus helycinus var. **fasciata** Jeff.—Benbecula.

T. grœnlandicus var. **dilatata** Jeff.—This is the normal form at Tromsø (Schneider)! Vadsø (Verkrüzen)! and Holsteinborg in Davis Strait ('Valorous' Expedition)!

T. olivaceus Brown.—Dredged by Mr. MacAndrew in 20-30f. in Skye (Jeffreys).¹ Jeffreys does not say how many specimens were dredged here, nor if alive, but as it is a fossil of the Clyde beds, its recent identity is desirable. The Rev. A. H. Cooke, in his list of the MacAndrew Collection, contained in the Cambridge University Museum, merely repeats "Sound of Skye."²

T. cinctus Phil.—A young specimen off the Shetlands in 155f., and several off the Faroes in 80-85f. (Simpson)!

The discovery of this pretty little shell in British waters occurred under amusing circumstances, while Gwyn Jeffreys, with Mr. Waller and another gentleman, had been dredging in the Shetlands for some weeks with very poor results. One night Mr. Waller, finding himself unable to sleep, came up on deck at two a.m., and as it was broad daylight and the circumstances appeared favourable, with the help of the night-watch he let down the dredge. After an interval, he hauled in again and examined the results, and then, rushing to the cabin stairs, excitedly called on Jeffreys and the other gentleman to "tumble up." They immediately hurried up in their night-shirts (there were no pyjamas in those days), and were greeted with the sight of several living specimens of *T. cinctus*, which were afterwards considerably added to by several good hauls.

T. magus var. **conica** Marsh.—My record of this variety from Heacham in Norfolk was an error, and must be disregarded.

T. lineatus Da C.—Many specimens are turbiniform instead of conical, owing to the last whorl being constricted.

var. **minor** Jeff.—Torbay.

T. striatus L.—Mediterranean specimens differ from British in that they are higher and narrower, the base more convex, and the

¹ Brit. Conch., vol. v., p. 202.

² Journ. of Conch., 1882, vol. iii., p. 362.

periphery less sharply keeled (as in *T. montacuti*), with the apex spiral and pointed. In British specimens the apex is invariably worn down, even in the young. Gwyn Jeffreys' figures of this and *T. exasperatus*, by an apparent error of the artist, have been transposed; nor should this species have a basal ridge encircling each whorl as there depicted.

T. miliaris Brocc.—The very young of this shell might easily pass for the same stage of *T. granulatus*; but this is shorter, and the second whorl is spirally sculptured; in the apex of *T. granulatus* the first whorl is coarser and more raised, and the second one is cancellated.

T. granulatus Born.—Sanda Island, at the mouth of the Clyde (Hyndman and Scott).

T. occidentalis Migh.—Clee, Lincolnshire, a specimen on the shore after a gale (A. Smith); off Withernsea, 20f. (Marine Bio. Assoc.); not uncommon in deep water off the Aberdeenshire coast, especially between Rattray and Kinnaird Heads, ten or twelve miles from land (Simpson).

A young dead shell of *T. suturalis* Phil., from the Shetland-Faroe Channel, was erroneously described as a new species by Mr. Jordan as *T. tetragonostoma*; and another immature shell of *T. ottoii* Phil. = *T. rhysus* Wats., from the same source, he described as *T. coulsoni*.

Three specimens of *T. ottoii* Phil., "dead but fresh," have been dredged off the Butt of Lewis in 545f. by the Scottish Fishery Board (Simpson)!

Phasianella pullus var. **pulchella** Récl.—Achil Island. Collectors must not confuse this variety with a dwarf of the type, equally small, which is abundant (and sometimes the normal form) on some parts of our coasts. These two dwarf forms are common to all the Channel Islands, but are not found living together.

Mr. Bartlet Span, of Tenby, in 1902 sent me a specimen of *P. speciosa* Mühlf., containing the animal and operculum, which he had found "on a seaweed-covered boulder at Lydstep Haven, near Tenby, during an unusually low tide." Its occurrence as a dead shell on the beach would have merited little notice, as it is a common Mediterranean species, and is sometimes used to ornament boxes, etc.; but its location at low tide, containing animal and operculum, and the fact that Lydstep Haven is very retired and seldom visited by boats or visitors, renders its presence there a matter of curiosity. Should its presence, however, be due to natural causes, more specimens may be expected to come to light to confirm its British origin. A subsequent inquiry in the neighbourhood of Lydstep Haven has disclosed the fact that the Member of Parliament for the county has a villa close by, and that he has a family of children who sometimes visit the Riviera, and also play on the Haven sands; but though just

possible, this would seem a rather slender source of introduction.

Mr. E. D. Marquand has also two specimens of *P. speciosa* from the shell-beach of Herm, both containing the dead animal and operculum. It should be remembered that the operculum of *Phasianella*, from its peculiar construction, is less easily detachable than in other genera, and there is nothing extraordinary in finding these shells still containing the operculum.

The *Cithna tenella* of Jeffreys cannot fairly be considered a British species up to the present. It has been dredged only in deep-sea expeditions by the 'Knight Errant,' 'Triton,' and 'Lightning,' but it may be discovered in the Shetland seas if any one again essays that interesting region for dredging researches. It is a deep-water species, and in addition to the above expeditions I can record specimens from some soundings at the great depths of 600 fathoms off Tunis, in lat. $36^{\circ}0' N.$, long. $12^{\circ}0' E.$, and near the same locality in 800 fathoms, in lat. $36^{\circ}25' N.$, long. $13^{\circ}20' E.$, soundings which were procured by H.M.S. 'Shearwater' when surveying those seas in 1871.

Lacuna divaricata var. **gracilior** Metc.—Achil Island.

L. puteolus var. **expansa** Jeff.—Alderney (Marquand).

L. pallidula var. **neritoidea** Gould. — Aberdeen (Simpson) ! Benbecula.

var. **naticiformis** Marsh.—Gareloch, a single specimen (Knight) ! Dornoch Frith.

var. **imperforata** Marsh. n.var.—Shell having the umbilicus wholly or partially closed. I have met with this from Guernsey only, where it is the normal form. It is analogous to *L. puteolus* var. *clausa* Jeff., though in this species the umbilicus and canal are much more characteristic of the type than in the latter.

Littorina obtusata L.—Mr. E. Duprey has taken a specimen at Jersey which had three eyes and three tentacles; the centre or abnormal eye was, however, double and smaller than the normal ones, placed side by side on a middle tentacle, which was bifid. A further development of this middle tentacle would have resulted in four eyes and four tentacles.

var. **ornata** Jeff.—Benbecula. Various collectors have recorded this variety from the Clyde, but I have found that in most of the cases (and I suspect in all) they were merely banded specimens of the type. Var. *palliatu* Say has a very close affinity to this variety. Specimens from Reykjavik in Iceland are intermediate between the type and var. *ornata*, and the three will be found to run one into the

other. From other northern parts, however, var. *palliat*a exhibits extreme diversity in the spire, ranging from the comparatively simple coil to the raised or conical, the extended (var. *elati*or G. O. Sars), and the elongated (var. *coarctata* G. O. Sars).

var. **compacta** Jeff.—At the mouth of Loch Fyne.

var. **æstuarii** Jeff.—Specimens taken from the river Deben at Woodbridge correspond to those from the Belfast estuarine deposits.

L. rudis Mat.—A ribbed form from Guernsey is indistinguishable from *L. grænlandica* Menke, from the Arctic coasts, and stamps the latter as no more than a variety.

var. **tenebrosa** Mont.—A small turreted form of this variety was found by Gwyn Jeffreys in the river Deben in Suffolk, and the same form was also found by him in the Arctic Expedition of 1875, covering the rocks on the shore at Godhavn in Davis Strait. I have the same thing from Tilbury Marshes. The finest specimens I have met with of this variety come from the Bass Rock, a rocky islet at the mouth of the Firth of Forth. These correspond to Jeffreys' otherwise too enlarged figure.

var. **similis** Jeff.—Port Erin, Isle of Man (Leicester) !

L. littorea L.—Mr. E. D. Marquand records this species, which is otherwise extremely rare in the Channel Islands, as "of frequent occurrence between tide-marks at Alderney."¹ Alderney is nearly thirty miles nearer the English coast than Guernsey, and is within ten miles of the French coast.

(To be continued).

OBITUARY NOTICE.

WILLIAM CASH.

By W. DENISON ROEBUCK, F.L.S.

PLATE VII.

(Read before the Society, April 14th, 1915).

Born at Leeds, April 28th, 1843.

Died at Halifax, December 16th, 1914.

WILLIAM CASH, though born at Leeds, was closely identified with Halifax, to which he came as a boy, and in his teens entered the service of the Halifax and Huddersfield Union Bank, in which he attained a good position. From this he retired to practice as an Accountant in association with his son, who is now in Oregon, U.S.A.

¹ Marine Shells of Guernsey, etc., Trans. Guern. Soc. Nat. Sci., 1901, p. 10, sep. copy.

He was a man of wide knowledge and multifarious activities, in politics, religion, freemasonry, literature, and science. But it is as a scientific student that he was most widely known and did his best work.

He was more particularly a palæo-botanist, working on the one hand at the Halifax coal-measure flora with such local workers as Binns, Lomas and others, and on the other with such specialists as W. C. Williamson, Thomas Hick, and Robert Kidston, and the "Cash Collection" of coal-measure plants, now in the Manchester Museum, is his worthy memorial.

As a conchologist he was a diligent and active worker, a very early member of the Conchological Society, and President in 1882. His services to the Society were very considerable and much appreciated, particularly in the Leeds branch, to whom his most loveable character and disposition endeared him. Possessed of a most eloquent, clear and sympathetic method of speech, he was *par excellence* the orator of the Society, who could most appropriately voice its appreciation of work done.

He was a keen collector and well acquainted with the British shells—marine as well as land and freshwater forms—and he took at one time special interest in the *Cephalopoda*.

He was—like so many other naturalists of Leeds birth—one of the body of men who, some forty years ago, reorganized the Yorkshire Naturalists' Union, and made it the powerful instrument of research it now is. His life was devoted to science, and he was a most acceptable lecturer on various subjects. At one time his services were given to Halifax as the chairman of its School Board. In the masonic body he became Worshipful Master in 1890. He was a Fellow of the Geological Society of London, editor of the publications of the Yorkshire Geological Society for a long series of years, and also its Hon. Treasurer from 1883 to 1901.

The various local scientific societies of Halifax had in him a most diligent worker, and as a Superintendent of the Young Men's Class at the South Parade Wesleyan School he rendered great service.

His papers to Societies and in Journals were numerous, but being mostly geological and palæo-botanical do not call for recital here.

Of recent years he was the recipient of a civil pension from the State and of an annuity from the Murdoch Trust.

His death, in his 71st year, was very sudden, due to hemorrhage from a fall in his own garden on returning from a short walk, and he is much mourned by those who knew him, his delightful companionship and cheerful and genial optimism making him popular with all who came under his spell.

A LIST OF THE RECENT SPECIES OF SPONDYLUS Linné,
with some Notes and Descriptions of Six New Forms.

By HUGH C. FULTON.

(Read before the Society, February 6th, 1915).

THE following is an attempt to list all the described species of *Spondylus* and arrange them in groups, according to the characters of their shells. The variation in species of this genus in form, colouration, number of ridges and spines is very great, so that they are often very difficult to identify; this is especially the case when the specimens, owing to a cramped position during life, have become very much worn or rubbed.

While endeavouring to give the chief synonymy and references, I have made no attempt to give all, my chief aim being to refer only to such figures as I felt sure represent the species in question.

The following illustrated monographs have been published:—

1845.—Chenu : Illustrations Conchyliologiques.

1848.—Sowerby, G. B. (second of the name) : Thesaurus Conchyliorum, vol. i.

1856.—Reeve, L. : Conchologia Iconica.

1858.—Küster : Conchylien Cabinet (2nd edit.), (plates were published 1842–53, the text in 1858).

Spondylus, type *S. gæderopus* Linné.

GROUP A.

- 1.—*S. gæderopus* Linné, Syst. Nat., ed. xii., p. 1136. Thes. Conch., fig. 29 and fig. 41. Conch. Icon., fig. 13. Conch. Cab. (2nd edit.), pl. 1, fig. 1, and pl. 2, figs. 1–2 and 4.

Hab. : Mediterranean.

S. gæderopus var. *camurus* Reeve. Conch. Icon., fig. 36.

Although said to come from the Philippines, this is to me a small light coloured variety of *S. gæderopus*.

- 2.—*S. violacescens* Lamk. Hist. Anim. Sans Vert., vi., 1819, p. 195. Illust. Conchyl., pl. 27, fig. 3.

Hab. : Australia (Chenu).

As Lamarck made no reference to any figures, we have only Chenu's figure to go upon until the actual type is examined. I have examined specimens which I take to be this species; they are very near *gæderopus*, but of a more uniform dark colouration, with shorter spines more regularly disposed.

Sowerby in Thes. Conchyl., p. 421, includes it in *spathuliferus*; he prints the name as *violascens* in the index, and *violaceus* on p. 421.

- 3.—*S. aurantius* Lamk. Hist. Anim. Sans Vert., vi., 1819, p. 192.
 Illust. Conchyl., pl. 23, figs. 2-4. Thes. Conch., pl. 84,
 figs. 1, 2, pl. 89, fig. 55. Conch. Icon., pl. 3, fig. 10.

Hab. : China Sea (Chenu). Seychelles (Sow.).

A very distinct species, easily recognised.

- 4.—*S. linguafelis* Sow. Proc. Zool. Soc., Lond., 1847, p. 87. Thes.
 Conch., i., p. 420, pl. 88, fig. 50. Conch. Icon., pl. 7, fig. 27.

Hab. ?

- 5.—*S. asperrimus* Sow. Proc. Zool. Soc., Lond., 1847, p. 87. Thes.
 Conch., i., p. 421, pl. 87, fig. 38. Conch. Icon., pl. 12,
 fig. 45.

Hab. : Philippines (Cuming).

When one examines the figures of *asperrimus* and *linguafelis* in the Conch. Icon., they appear to be decidedly one species; but an examination of Sowerby's type in the British Museum collection confirms his view of their distinctness. The *linguafelis* is a heavier shell, of darker colour and different form. On the anterior and posterior sides of *asperrimus* are seen short colour-lines, similar to those found on *ducalis*, *variegatus*, etc.

GROUP B.

- 6.—*S. violaceus* Reeve. Conch. Icon., pl. 16, fig. 57.

Hab. ?

- 7.—*S. reevei* Fulton, n.n.

(=*hystrix* Reeve. Conch. Icon., pl. 12, fig. 42, non
 Bolten).

Hab. : Philippines (Cuming).

Closely allied to *cuneus*, and may prove to be the same species.

- 8.—*S. cuneus* Reeve. Conch. Icon., pl. 15, fig. 56.

Hab. : West Indies.

- 9.—*S. electrum* Reeve. Conch. Icon., pl. 15, fig. 54.

Hab. : West Indies.

The colouration of the figure quoted is not good; the type specimen is orange (not yellow), with dark purple spines on lower part of upper valve.

GROUP C.

- 10.—*S. zonalis* Lamk. Hist. Anim. Sans Vert., vi., 1819, p. 193.
 Illust. Conchyl., pl. 7, figs. 4 and 4a (not 3). Thes. Conch.,
 pl. 85, fig. 12; pl. 86, fig. 27; pl. 89, fig. 60. Conch. Icon.,
 pl. 8, fig. 29a, b.

(=*herinaceus* Chenu, Illust. Conchyl., pl. 25, figs. 3
 and 4).

Hab.: Indian Ocean (Chenu). Mauritius (Sow.). Philippines
 (Cuming).

Lamarck gave no reference to figures; Chenu's fig. 3 on pl. 7
 Illust. Conchyl. may be a variety of *albibarbatus* Reeve, which varies
 a good deal in colour. I am in doubt as to whether *herinaceus*
 Chenu is *zonalis* or a variety of *reevei* (= *hystrix* Reeve). Sowerby's
 figures in the Thes. Conch. are probably over-coloured, and one figure
 given by him on pl. 85, fig. 18, is not, I think, a *zonalis* at all; it
 looks like a too highly-coloured *marisrubri* Bolt.

- 11.—*S. setiger* Reeve. Conch. Icon., pl. 15, fig. 53.

Hab.: Philippines.

The colouration of the figure in Reeve's work is not good; the
 type specimen is of a dark reddish-brown.

- 12.—*S. albibarbatus* Reeve. Conch. Icon., pl. 9, fig. 32.

Hab.: Philippines (Cuming).

Varies in colour from nearly all pure white to specimens almost
 covered with light brown.

- 13.—*S. plurispinosus* Reeve. Conch. Icon., pl. 5, figs. 18a, b.
 Encyclopédie Méthodique, pl. 194, fig. 1. Conchyl. Cab.,
 ix., p. 143, pl. 115, figs. 989-90.

Hab.: Philippines (Cuming).

This may prove to be the same as the following species.

- 14.—*S. albus* Chenu. Illust. Conchyl., p. 5, pl. 28, fig. 5. Conch.
 Cab., ix., pl. 115, figs. 988, 990.

Hab.: Indian Seas (Chenu).

- 15.—*S. virgineus* Reeve. Conch. Icon., pl. 9, fig. 31.

Hab.: Philippines (Cuming).

- 16.—*S. fragilis* Sow. Thes. Conch., p. 426, pl. 89, fig. 57. Conch.
 Icon., pl. 13, fig. 48.

The shells given in the Conchyl. Cab., pl. 10, figs. 1, 2, belong to
 the *vevillum* group, and do not, I think, represent Sowerby's *fragilis*.

GROUP D.

- 17.—*S. marisrubri* Bolten. Museum Boltenianum, 1798, p. 194.
Conch. Cab., vii., pl. 44, fig. 460.

(=*dentatus* Chenu, Illust. Conchyl., p. 5, pl. 25, fig. 1,
pl. 27, fig. 2).

(=*aculeatus* Sow. Thes. Conch., pl. 85, figs. 11-13,
Conch. Icon., pl. 17, fig. 63).

Hab.: Mauritius (Sow.). Australia (Chenu).

- 18.—*S. ambiguus* Chenu. Illust. Conchyl., p. 5, pl. 28, fig. 1.

Hab.: American Seas (Chenu).

- 19.—*S. castus* Reeve. Conch. Icon., pl. 12, fig. 47. Conch. Cab.
(2nd edit.), pl. 9, fig. 5.

Hab.: Philippine Islands.

The type is a medium-sized specimen; some specimens are much larger, having somewhat the appearance of *marisrubri*.

GROUP E.

- 20.—*S. hystrix* Bolten. Museum Boltenianum, p. 195. Conch.
Cab., vii., pl. 45, fig. 470. Illust. Conchyl., pl. 28, figs. 2-4.

(=*radialis* Lk. Hist. Anim. Sans Vert., vi., p. 192).

(=*aculeatus* Brod. Proc. Zool. Soc., 1833, p. 5).

(=*ciliatus* Sow. Thes. Conch., vol. i., pl. 89, fig. 52.
Conch. Icon., fig. 4).

(=*nicobaricus* Sow. Thes. Conch., pl. 88, fig. 48).

(=*coccineus* Sow. & Reeve, non Lamk. Thes. Conch.,
pl. 88, fig. 47. Conch. Icon., pl. 12, fig. 44).

Hab.: Nicobar and Timor Islands (Chenu). Mauritius, on floating pumice stone from eruption of Krakatoa, Sunda Straits (Robillard). Lord Hood's Island (Cuming).

Very variable in degree of spinosity, some specimens having very numerous and closely-set spines, whilst others are in appearance almost smooth. A large series from Mauritius varies from almost plain white to specimens half covered on lower part with purple-brown.

S. hystrix var. *ocellatus* Reeve. Conch. Icon., pl. 12, fig. 43.

Hab.: Philippine Islands (Cuming).

Somewhat similar specimens have been found at Mauritius on floating pumice stone, but the spots are more numerous and the ground-colour more reddish than the specimens collected by Cuming at the Philippines.

- 21.—*S. gracilis* Chenu. Illust. Conchyl., p. 5, pl. 26, fig. 1.

Hab. : Indian Seas (Chenu).

Probably a smooth variety of *hystrix* Bolt.

- 22.—*S. asiaticus* Chenu. Illust. Conchyl., p. 5, pl. 24, figs. 1, 2.

Hab. : Indian Seas (Chenu).

- 23.—*S. spectrum* Reeve. Conch. Icon., pl. 14, fig. 49.

(=*nicobaricus* Reeve, non Sow. Conch. Icon., pl. 14, fig. 50).

Hab. : Philippines (Cuming).

Most of the specimens that I have seen of this species have not their spines so close set as in the type.

GROUP F.

- 24.—*S. reesianus* Sow. Journ. of Mal., 1903, vol. 10, p. 77, figd.

Hab. : Moluccas (Admiral van Rees).

- 25.—*S. sowerbyi* Fulton (=*digitatus* Sow. Proc. Zool. Soc., 1847, p. 87, non Perry, 1811). Thes. Conch., i., pl. 89, figs. 58, 59. Conch. Icon., pl. 18, fig. 68.

Hab. : Bermuda (Cuming coll.).

GROUP G.

- 26.—*S. regius* Linné. Syst. Nat., ed. xii., p. 1136. Illust. Conchyl., pl. 7, figs. 1, 2. Thes. Conch., fig. 30. Conch. Icon., fig. 20.

Hab. : Sooloo Islands (Cuming). Japan (Stearns).

- 27.—*S. cumingi* Sow. Thes. Conch., i., p. 425, fig. 62. Conch. Icon., figs. 35a, b.

Hab. : Java (Sow.). Japan (Reeve).

Probably only a frondose variety of *regius*.

- 28.—*S. imperialis* Chenu. Illust. Conchyl., p. 6, pl. 26, figs. 2, 3. Thes. Conch., figs. 43, 44. Conch. Icon., fig. 28. Conch. Cab. (2nd edit.), pl. 9, fig. 1.

Hab. : Indian Seas (Chenu). China (Sow. and Reeve).

S. imperialis v. *purus* Fulton n.v. Conch. Icon., pl. 16, fig. 28b.
Hab. ?

A white variety of which I have seen two specimens.

- 29.—*S. victoriae* Sow. Proc. Zool. Soc., 1859, p. 428, pl. 49, fig. 8.

Hab. : Flinders and Claremont Islands, N.E. Australia (Coppinger).

In the voyage "Alert," 1884, Mr. E. A. Smith notes that Sowerby's locality "Gulf of California" is incorrect. The frondose spines distinguish this from the following species.

- 30.—*S. wrightianus* Crosse. Journ. de Conchyl., 1872, vol. 20, p. 360, vol. 21, pl. 9, fig. 1.

(=*armatus* Sow., Thes. Conch., 1848, vol. i., p. 424, fig. 53; not *armatus* Goldfuss, fossil, Petrefacta Germaniæ, 1826-44, p. 96).

Hab.: Nichol's Bay, Australia.

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GROUP H.

- 31.—*S. coccineus* Lamk. Anim. Sans Vert., vol. vi., p. 190. Illust. Conchyl., pls. 14, 15 (not pl. 25, fig. 2).

Hab.: American and Indian Seas (Chenu).

The type of this species was in the "Dufresne" Collection, which has probably been dispersed and the types lost sight of. Lamarck referred to three figures: the one in Gualt. Test., t. 99, fig. E, agrees very well with those figured by Chenu; the second, fig. F, is difficult to identify; and the third, in D'Argenville Conch., t. 19, fig. E, might possibly be a *S. gæderopus*. The *coccineus* of Sow. and Reeve, in Thes. Conch., fig. 47, and Conch. Icon., fig. 44, are varieties of *hystryx* Bolten.

- 32.—*S. microlepos* Lamk. Anim. Sans Vert., vi., p. 192. Thes. Conch., fig. 46, Conch. Icon., figs. 65a and b.

Hab.: China (Sow.).

- 33.—*S. gilvus* Reeve. Conch. Icon., pl. 11, fig. 38.

Hab.: Guadaloupe.

- 34.—*S. erinaceus* Reeve. Conch. Icon., pl. 11, fig. 39.

Hab.: West Indies.

- 35.—*S. ictericus* Reeve. Conch. Icon., pl. 11, fig. 40.

(=*multilamellatus* Chenu (non Lamarck), Illust. Conchyl., pl. 11, figs. 1, 2).

Hab.: Bermuda.

The type specimen is a very worn example of an extremely variable species; the figures quoted above perhaps illustrate the limits. I have examined a series that quite joins up those two figures. The spines vary from short pointed to spathulate, and the number of principal ridges varies from four (as in Reeve's figure) to eight or nine.

- 36.—*S. electus* Fulton, n.sp.

Shell pectiniform, moderately thick, upper valve purple-brown, variegated with whitish, very finely longitudinally ridged, the ridges bearing short spines and scales, mostly on the posterior area; lower valve orange-red at area of attachment, the free anterior portion of a greyish colour, with numerous close-set ridges, bearing short spines; ligamental area produced; interior white, with a broad purple-brown margin.

Maximum dimensions: Height (umbonal to ventral margins), 61 mm. Width (anterior to posterior), 58 mm. Depth or diameter, 35 mm.

Hab. ?

Compared with the ordinary forms of *ictericus* Reeve (the type of that species is a worn specimen) our species is distinguished by its variegated colouration, the closer disposition of the ridges, and the finer spines.

I have examined four specimens, two of which are flatter above than the type, and have their sides compressed, probably owing to situation during life. In addition, there are also two typical specimens in the National Collection.

- 37.—*S. tenuispinosus* Sow. Thes. Conch., i., p. 421, pl. 87, fig. 37.
Conch. Icon., fig. 23 (not *S. tenuispina* Sandberger (fossil),
Die Conchy. Mainzer Tert., 1863).

Hab.: Island of Zebu, Philippines (Cuming).

The type specimen in the British Museum is the only one I have seen of this species.

- 38.—*S. ramosus* Reeve. Conch. Icon., pl. 14, fig. 51. Conch. Cab.
(2nd edit.), pl. 2, fig. 3.

Hab.: West Indies.

The type, as figured by Reeve, has very frondose spines; this specimen I have been unable to find in the British Museum collection. There are two specimens in the British Museum (Cuming collection) similar to Reeve's figure, except that only one of them has its spines slightly frondose. I consider *ramosus* may be simply a yellow variety of *ictericus* with foliated spines.

- 39.—*S. imbutus* Reeve. Conch. Icon., pl. 15, fig. 55.
(=*nux* Reeve. Conch. Icon., pl. 18, fig. 64).

Hab. ?

GROUP I.

- 40.—*S. ducalis* Bolten. Museum Boltenianum, 1798, p. 194. Conch.
Cab., vii., pl. 47, fig. 477 (not 476). Illust. Conchyl., pl. 8,
figs. 2, 3. Thes. Conch., fig. 16. Conch. Icon., fig. 26.

Hab.: Indian Ocean (Chenu). Philippine Islands (Cuming).

In the 2nd edition of the Conch. Cab., Küster gives on pl. 8a, figs. 1 and 3, figures that probably represent *ictericus* Reeve rather than *ducalis*, the name under which they appear.

S. ducalis var. *lamarcki* Chenu. Illust. Conchyl., p. 6, pl. 9,
figs. 3, 4. Thes. Conch., fig. 20 (not fig. 63). Conch.
Icon., fig. 30.

Hab.: Indian Ocean (Chenu).

When in good condition with its spines not worn off it is seen to be but a dark coloured variety of *ducalis*.

- 41.—*S. sinensis* Sow. Thes. Conch., i., p. 427, pl. 87, figs. 32, 33 (not 34). Conch. Icon., fig. 7.

Hab. : China ; Japan (Lischke).

I do not think the fig. 34 given by Sowerby is *sinensis*, but a variety of *ducalis*. Among the many specimens of *sinensis* that I have examined, I have never seen one with the dark maculations on the umbonal region as in fig. 34.

- 42.—*S. barbatus* Reeve. Conch. Icon., pl. 4. fig. 16.

Hab. : Philippines (Cuming).

A second specimen in the British Museum is of the same colour, light purple-brown, but its spines are not nearly so spatulate as in the type specimen.

Possibly a variety only of *sinensis*.

GROUP J.

- 43.—*S. variegatus* Bolten. Museum Boltenianum, 1798, p. 194. Conch. Cab., vii., pl. 45, fig. 464. Illust. Conchyl., pl. 10, figs. 1-3. Thes. Conch., figs. 14, 15. Conch. Icon., fig. 8.

Hab. : Indian Ocean (Chenu). Amboyna (Reeve).

S. variegatus var. *mus* Reeve. Conch. Icon., pl. 3, fig. 12.

Hab. : Philippine Islands (Cuming).

- 44.—*S. lamyi* Fulton, n.sp.

Shell subcircular, moderately solid, very convex above and somewhat concave at area of attachment below, purple with white nucleus and some whitish lines at the margins, these lines being more conspicuous on the lower valve ; upper valve with about sixteen longitudinal ridges, more or less prominent, bearing some short vaulted spines, a few longer spines on the lower valve ; between the principal ridges are four or five very fine ridges or striæ ; ligamental area somewhat produced, the umbones being about 11 mm. apart ; interior of shell white, with a narrow band of dark purple encircling the margins of the valves.

Maximum dimensions : Height, 70 mm. ; width, 62 mm. ; depth or diameter, 27 mm.

Hab. ?

A smaller specimen examined by me has more numerous ridges (about twenty-five) and spines. The very convex upper valve and different colouration separate this from *variegatus*.

Named in honour of Monsieur E. Lamy of the Paris Museum.

(To be concluded).

shell so-named by Hanley, which is whitish, very faintly tinged with purple, with purple umbones, and violet purple within the valves which are not so glossy externally.

Of course the two species are very distinct, not only on account of differences of colouration, but they also vary in sculpture, pallial sinus, etc., and are from widely separated localities, the true *splendida* being West African, and the *Strigilla tomlini* (= *splendida* Auct.) from the Philippine Islands (Reeve), Sumatra and Moluccas (Bertin), and North Queensland (Brit. Mus.).

Had Anton given the locality of his species it would probably have prevented Hanley's misidentification.

EDITORIAL NOTES.

THE University of Leeds has intimated its intention to confer the Honorary Degree of M.Sc. on Mr. J. W. Taylor and Mr. W. Denison Roebuck in recognition of their scientific work.

We are sure that all members of the Society will join in congratulating them both on so well merited a distinction.

We are greatly indebted to Messrs. T. Sheppard and T. W. Woodhead, the editors of *The Naturalist*, for the loan of the portrait block of the late Mr. W. Cash which we are using in this number.

The following letter has been received from the Smithsonian Institution, and has been suitably acknowledged:—

“Smithsonian Institution,
United States National Museum,
Washington, D.C., April 2, 1915.

Editor, *Journal of Conchology*,

J. R. le B. Tomlin, Esq.,

Lakefoot, Hamilton Road, Reading, England.

Dear Sir,—

The Smithsonian has just printed an historical account and complete index to the *Museum Boltzenianum* (1798). It will be sent to all persons on the Malacological List of the U.S. Nat. Museum without application; but as there may be others interested in nomenclature who would like to possess a copy, I am requested to ask you to notify the readers of the *Journal of Conchology* that copies will be furnished to applicants as long as the edition lasts, on application to the Secretary of the Smithsonian Institution.

I remain,

Yours very truly,

WM. H. DALL.”

THE NOMENCLATURE OF BRITISH MARINE MOLLUSCA.

By TOM IREDALE.

(Read before the Society, March 10th, 1915).

"As no list of British Marine Mollusca has been published for fourteen years" begins the List of Marine Mollusca published in this Journal just fourteen years ago.

I write this note suggesting that it is time that a new list be prepared "incorporating the results of recent researches."

I have little special knowledge of the species of British Marine Mollusca and would have claimed no more than an academic interest in them, but many of the generic names are common to that fauna and the Antipodean fauna with which I am more familiar and which engages my attention. In working at my Antipodean material I have continually to refer to British forms, as they represent generic types which I have to examine. While thus employed I make note that the British List is now sadly out of date and I propose to indicate herewith a few of the alterations necessary in view of my studies and suggest that these be considered and approved or rejected.

I further suggest that a list with the original references cited would be most valuable, not only to British workers, but also to extralimital investigators, who are unable to make personal reference to works themselves.¹

In view of recent monographs a reconsideration of family values is also probably necessary.

Dall and Bartsch's Monograph of the *Pyramidellidae*, Dall's monumental effort on the Tertiary Mollusca of Florida, Jukes-Browne's controversial papers on Bivalves, Thiele's Revision of the *Polyplacophora*, the conclusion of Alder and Hancock's Nudi-branchs by Chas. Eliot, Hoyle's Cephalopod Revision have all appeared since 1901. The last two I have not yet been concerned with, so do not know how they affect the list.

Some of the generic names hereafter mentioned may need discussion, but I simply mention some of those I have noticed as needing emendation or justification.

Order **Polyplacophora.**

Only one family, *Chitonidae*, is admitted, but recent studies prove that more should be recognised.

¹ Since this was penned I have compiled such a List with, to me, startling results.

Thus the British forms would be classed thus:

FAMILY LEPIDOPLEURIDÆ.

GENUS **Lepidopleurus** Risso.

Hanleya Gray.

FAMILY LEPIDochITONIDÆ.

GENUS **Tonicella** Carpenter.

Callochiton Gray.

Lepidochiton Gray (em).

(=*CRASPEDOCHILUS* Sars).

FAMILY CRYPTOCONCHIDÆ.

GENUS **Acanthochiton** Gray (em).

The reasons for these alterations I have given in the Proc. Malac. Soc. Lond., vol. xi., pp. 126-129, 1914.

GENUS **Modiolaria** Beck.

I propose to displace this by *Musculus* Bolten, Mus. Bolten, 1798, p. 156, designating as type of that genus *Musculus discors* Bolten = *Mytilus discors* Linné. Details concerning this will be elsewhere given.¹

GENUS **Pecten** Müller.

I would generically separate from *Pecten* Müller, *Hinnites* Defrance and *Chlamys* Bolten. Under this latter genus, *Hyalopecten* Verrill, *Aequipecten* Fischer, *Peplum* B.D. & D. and *Palliolum* Monterosato might be given subgeneric rank.

GENUS **Arctica** Schumacher.

Mr. E. A. Smith has argued (Proc. Malac. Soc., Lond., vol. x., p. 105, 1912) for the rejection of this name in favour of *Cyprina*. My reading of the nomenclatural rules would compel me to retain *Arctica*. This is one of the debatable points upon which discussion is necessary, though I consider the rules are so simple that there is little danger of misreading them.

GENUS **Loripes** Poli.

Again this is a debatable point, but I cannot accept any of Poli's generic names. In the present case this name was proposed for the animal of *Tellina lactea* Linné, and I note that he named the shell *Loripoderma*. Such a double nomination seems to me mutually to render each invalid. *Lucinida* D'Orbigny is the name I at present accept.

¹ I communicated my results to Dr. W. H. Dall by letter, and he has confirmed my selection in the *Nautilus*, vol. xxviii. (Apr. 1915), p. 138.

Genus **Cryptodon** Turton.

Thyasira Lamarck has been used on the score of priority. This name was simply introduced in synonymy, but this has been considered acceptable under the present nomenclatural laws.

Genus **Venus** Linné.

A criticism of Dall's and Jukes-Browne's papers would probably necessitate alterations in the subgenera here admitted. The type of *Venus*, as determined by Dall and confirmed by Jukes-Browne, seems to need reconsideration in view of my data.

Genus **Tapes** Megerle von Mühlfeld.

This should be displaced generically by *Paphia* Bolten, while subgenera should be admitted.

Genus **Irus** Oken.

This name has recently been replaced by *Venerupis* Lamarck.

Genus **Psammobia** Schumacher.

Gari Schumacher has priority and seems coincident. I know of no valid reason for the rejection of this name.

Genus **Acmaea** Eschscholtz.

The British shells, either viewed conchologically or anatomically, are not congeneric with the type of *Acmaea*, which moreover is invalidated by a prior *Acmea*. *Tectura* should be revived.

Genus **Eumargarita** Fischer.

Margarites Gray 1847 was proposed as a substitute for the pre-occupied *Margarita* Leach over thirty years prior to Fischer's introduction and is now commonly in use.

Genus **Monodonta** Lamarck.

I would not consider the British species congeneric with the Austral type of Lamarck's genus and I note that Pilsbry placed it in the genus *Osilinus*.

Genus **Littorina** Férussac.

I consider the genus here shown to be polyphyletic and would restrict *Littorina* to *obtusata* (Linné), using *Melarhaphe* Menke for *neritoides* (Linné) and probably some other name for the remaining members, which I have not studied.

Family **Rissoïdæ**.

Too many genera seem here recognised and a careful revision is necessary. I had occasion to study the Norman Collection, now in the British Museum, in an attempt to fix the generic names commonly applied to Neozelanic Rissoïds and came to the above conclusion.

Ceratia and *Setia* are invalid and must be replaced by (probably) some of the names given by Monterosato.

Genus **Adeorbis** S. V. Wood.

I have been able to prove that this name must be replaced by *Tornus* Turton & Kingston (Proc. Malac. Soc., Lond., vol. xi., p. 171, 1914). As it is considered of family rank the family name must also be changed to *Tornidae*.

Genus **Natica** Adanson.

Natica dates from Scopoli, as recognised in the revised List, but the genus does not occur in British waters. In the list all the British species are referred to the subgenus *Lunatia* Gray. This must be given generic rank but the name to be used appears to be *Ampullina* Bowdich or *Euspira* Agassiz.

Genus **Triforis** Deshayes.

This must be replaced by *Triphora* Blainville, though it may be that the British form is generically distinct.

Genus **Newtoniella** Cossmann.

Cerithiella Verrill must replace this name. I indicated this emendation in the Proc. Malac. Soc., Lond., vol. ix., p. 260, 1911, and my conclusion has been confirmed by Thiele and E. A. Smith.

Genus **Scala** Humphrey.

Humphrey's work is not admissible and the name to be used is *Epitonium* Bolten. Again, when these matters come under careful consideration the British shells may be considered generically distinct from the type of *Epitonium*.

Genus **Solarium** Lamarck.

Architectonica Bolten has priority and is now commonly in use as is the family name *Architectonicidae*.

Family **Pyramidellidæ**.

Dall & Bartsch's Monograph must be carefully considered, but neither the nomenclature nor classification can be entirely accepted. More study than I have given this group is necessary to outline all the alterations to be made, but that such are inevitable is obvious from my rough notes.

Family **Eulimidæ**.¹

Whether *Eulima* be retained as distinct from the prior *Melanella* the family name must be changed to *Melanellidæ*. The subgenus *Leiostraca* must be generically separated and the name changed to *Subularia* Monterosato as *Leiostraca* is preoccupied.

¹ Since this was penned I have determined *Strombiformis* Costa as applicable and anterior to *Subularia* and the family name would be *Strombiformidæ*. Also *Melanella* is not apparently separable from *Eulima*.

Family **Lotoriidæ**.

This name must be changed to *Cymatiidæ* and the genus name *Lotorium* replaced by *Charonia* and *Cymatium*.

The alterations would read :

FAMILY CYMATIIDÆ.

GENUS **Charonia** Gistel.

CHARONIA LAMPAS (Linné).

(=*NODIFERUM* Lamarck).

GENUS **Cymatium** Bolten.

SUBGENUS *CABESTANA* Bolten.

CYMATIUM CUTACEUM (Linné).

Genus **Ocinebra** Gray.

Tritonalia Fleming is equivalent and many years older and should replace *Ocinebra* Gray, as pointed out by Jousseaume in 1886.

Genus **Trophon** de Montfort.

Should not this name be replaced by *Trophonopsis* B.D. & D.? If not, that name must certainly be subgenerically cited and also *Boreotrophon* Fischer.

Genus **Purpura** Bruguière.

This must be replaced by *Nucella* Bolten. *Purpura* Bruguière is antedated by *Purpura* Martyn, the type of which is the Californian *foliata* Martyn, the name thus displacing *Cerastoma* Conrad. The family name *Thaididæ* would here come into use.

Family **Columbellidæ**.

The family name must be changed to *Pyrenidæ* whilst it would be best to give *Astyris* and *Anachis* generic rank.

Family **Nassidæ**.

This name must disappear as *Nassa* was used by Bolten before Lamarck's usage, and Bolten proposed it for the shell commonly known as *Iopas sertum* (Bruguière). Dall has proposed *Alectrionidæ* but in accordance with the rule that the family name must be based on the oldest generic name, *Arculariidæ* is the name to be utilised.

Examination of living specimens of *reticulata* Linné would force the acceptance of *Tritia* Risso, based on this species, in preference to the introduction into British literature of either *Arcularia* or *Alectrion* based on exotic species which are not congeneric in my estimation.

Family **Pleurotomidæ**.

This family name also disappears, *Pleurotoma* Lamarck falling as an absolute synonym of *Turris* Bolten, from which the family name

Turridæ is derived. The genera in this family are difficult and probably alterations will here be made. I have indicated that *Lora* Gistel is equivalent and anterior to *Clathurella* Carpenter.

Genus **Bullinella** Newton.

Cylichnella Gabb has been used as anterior to this, but probably other names antedate this.

The preceding very rough notes are sufficient to call for revision of the List, when probably many other necessary alterations will be brought to light.

It is more than probable that many specific emendations are also necessary and if progress in Marine Mollusca has kept pace with that made in the Land Molluscs, as shewn in Kennard and Woodward's List of Non-Marine Molluscs, numerous additions must be made. In ten years the Land Molluscs have advanced in number from 170 to 210, so that fourteen years should show a numerical increase in Marine Molluscs also.

I would emphasize the fact that it is more than probable that careful study would show that many of the names hitherto in use have no right, as well as *Monodonta*, *Natica* and *Nassa*.

Having collected typical shells of these three, I was very surprised when I found that British shells which I collected, showing very little of the characters I knew, were referred to these genera, and this fact instigated this medley.



Additions to the Land and Freshwater Mollusca of Wigtownshire.—

To help in the work on the acceleration of the Census I made arrangements to pay a visit to the western portion of Wigtownshire, the whole county record at the time being 17 species. The following additions to the list resulted:—*Arion ater* (L.) var. *castanea*, frequent at Stranraer in juvenile stage. *Arion intermedius* Norm., under old timber, Port Patrick. *Arion intermedius* var. *grisea* Roebuck, roadsides around Stranraer, frequent under stones. *Arion subfuscus* (Drap.), numerous and fine under stones, Stranraer. *Milax gagates* (Drap.) var. *rava* Williams, frequent under old timber, Port Patrick. *Hyalinia radiatula* (Alder), scarce, Dunskey Wood. *Zonitoides excavatus* var. *vitrina* Fér., common under roadside rubbish, Stranraer. *Zonitoides nitidus* (Müll.), scarce, Dunskey Wood. *Helix aspersa* Müll., a few in the Battery, Port Patrick. *Hygromia rufescens* Auct., scarce, Stranraer, on nettles. *Hygromia hispida* (L.), frequent, the Battery, Port Patrick. *Helicella caperata* (Mont.), frequent, the Battery, Port Patrick. *Acanthinula aculeata* (Müll.), rare, one, Dunskey Wood. *Cochlicopa lubrica* (Müll.), numerous round Stranraer. *Carychium minimum* Müll., apparently rare, one, Dunskey Wood. *Clausilia bidentata* (Ström), much the commonest shell in the district. *Pupa cylindracea* (DaC.), plentiful under stones, Dunskey Wood. *Ancylus fluviatilis* Müll., numerous under stones in burn by roadside, Port Patrick to Stranraer.—J. F. MUSHAM (Read before the Society, January 13th, 1915).

CONCHOLOGICAL NOTES FROM CHILE AND BRAZIL.

BY LIONEL E. ADAMS, B.A.

(PLATE VI.).

(Read before the Society, 9th December, 1914).

ON December 11, 1913, we arrived at Santos with a cargo of railway stock from Antwerp, and during our stay in that port, with the kind guidance of Mr. Harling, a correspondent of one of the members of this Society, I was enabled to visit the various sea-beaches in the neighbourhood. These at first sight most promising stretches of sand, at intervals along the rocky coast, yielded few shells, and those of no importance. It was, moreover, most tantalising to find that the seabirds had been beforehand and smashed up all the live shells left by the retreating tide.

To my surprise the wooded hills round Santos were devoid of shells, in spite of the tropical rain that fell at frequent intervals during my stay. We next visited Paranagua to discharge more cargo, and here, too, I was from a conchological point of view disappointed. The town is situated in a magnificent lagoon, larger than that at Rio, and surrounded by mountains covered with forest, which comes down to the water's edge. A thorough search of the shore for many miles only produced the very plebeian *Littorina flava* Brod., which thrives in enormous quantities among the scrub lining the water.

We then proceeded to Rio Grande do Sul, on the Lago de Patos, an inland sea, one hundred miles in length. The surrounding country being low sandy desert is absolutely destitute of molluscan life, and the lagoon itself only contains an unattractive lot of Lamelli-branches belonging to the *Cyrenidæ*.

I made enquiries everywhere as to the localities of the giant *Bulimi*, which European conchologists imagine to infest the entire country of Brazil, and I learnt that they are only found inland at a much greater elevation than the sea level. I had been supplied by Mr. H. B. Preston with specially made sacks for stowing moss, dead leaves, and other débris, which collectors in Britain find so fruitful in small species; and I made many excursions along the forest paths round Paranagua and into the jungle itself in search of material. The material, however, was not there. Tropical trees and-creepers do not shed their leaves at a given season, and only an occasional dead leaf is to be found, and the soil, being either peaty or sandy, is

quite an unsuitable habitat for mollusks. Nevertheless, I spent hours in examining with a lens quantities of this unpromising material from the most likely places without finding the smallest fragment of any shell whatever. The swamps were alike unproductive of freshwater species. I have for many years been in the habit of examining anchor-mud for small shells—often with interesting results. In Brazil my siftings only resulted in a single example of a minute *Cylichna* at Paranagua.

From Brazil we proceeded, via the Strait of Magellan, to the nitrate coast of Chile. We anchored one night at the ill-fated Port Famine, a small collection of squalid wooden huts, on the east side of Cape Froward, the most southerly point of the mainland of South America, and here I collected a quantity of anchor-mud, which subsequent examination by Mr. H. B. Preston (*see below*) proved interesting, as it contained no less than four new species. I had no opportunity of landing, or of dredging in the strait, but judging by the accounts of Darwin in the "Voyage of the 'Beagle,'" R. O. Cunningham in "Notes on the Natural History of the Strait of Magellan," and W. P. Snow in "A Two Years' Cruise in Terra del Fuego," there is a great deal to be done, especially with the small species. Though our passage was made on January 27 (the midsummer of the southern hemisphere), the weather was bitterly cold, the sun only now and then breaking through violent sleet and rain squalls. On our homeward passage, some weeks later, we came through without stopping to anchor, and enjoyed one of the proverbial four fine days that occur yearly in those parts, and I was enabled to take a series of photographs of the glaciers and snow-capped mountain peaks so well known from the descriptions of the authors above referred to.

Our next stop was at Coronel, up the Chile coast, where I obtained from the débris emptied from fishing boats some enormous *Mytilus magellanicus* Ch., covered with a fine series of *Calyptrea*. These huge mussels proved excellent eating. The anchor-mud here, though containing interesting *Foraminifera*, proved destitute of mollusks.

We then proceeded to the nitrate coast, and spent some days loading at Iquique, Caleta Buena, and Pisagua. Along the coast of the nitrate region, for some four hundred miles, the mountains in an almost unbroken line descend steeply into the sea, and most of the small coast towns are built on a narrow talus at the water's edge. No rain having fallen for more than fifty years, there is absolutely no vegetation, and the small streams which trickle down the gullies here and there are so impregnated with nitrate that the water is undrinkable—all drinking water is condensed and very dear. The inhabitants, however, seem to prefer "pisco," a native spirit, which takes its

name from the chief town where it is distilled. Nor, apparently, do the natives appreciate the natural water for washing. Of course, in a district absolutely destitute of vegetation, no wild land creatures are to be found, except a few lizards on the rocks above the wash of the surf, though what they feed upon I could never discover. Perhaps they prey upon the *Ligiæ*, which are abundant; flies are too scarce to furnish a constant livelihood. This region of desolation extends for ten to fifty miles inland, and under these conditions the collector of land and freshwater species, of course, draws an absolute blank.

I therefore turned my attention to marine species, and made many excursions along the rocks. To collectors desirous of a spice of excitement with their occupation I can heartily recommend this district. Large irregular masses of granite, weathered smooth and slippery with kelp, afford a most precarious foothold, and a slip might easily deposit one in a deep pool or cleft, without a possibility of extricating oneself. Moreover, on the calmest day there is always a tremendous surf and a huge irregular swell, which one has to watch carefully to avoid being washed off the rocks altogether. It is always just within the range of this surf that the finest specimens are to be found, and several times an ill-timed dash for these ended in a hurried scramble of retreat, and often a complete wetting as well; and I never returned from these excursions otherwise than scratched, bruised, and wet through. On one of these occasions, at Caleta Buena, I chanced upon specimens of what proved to be two new species of *Astyris*.

At Pisagua, leading from the south end of the town, there is an ancient coast-road on the steep mountain-side. Where it leaves the town it is about a hundred feet above sea-level, and it has recently been improved by cutting it deeper into the hill on the landward side. On passing this cutting, which is about four feet deep, I noticed strata of sea shells, which immediately reminded me of similar deposits on other parts of the coast, which Darwin in the "Voyage of the 'Beagle'" described as raised beaches. A further examination of the spot showed that the road traversed an Inca burying ground. I found that the place had been recently excavated. Several human skeletons were lying on or just below the surface, all in the characteristic doubled-up attitude; they had been buried wrapped up in a coarse grass matting. None of the skulls were perfect, the upper and lower jaws were all missing, as if the excavators had taken them to study the dentition.

In addition to human remains, were skulls of some large species of dolphin, skulls of sea-lions (? *Otaria jubata*), the rib of a small whale, and dogs both large and small; to one of the latter, which was enve-

loped in matting, the reddish hair was adhering.

I collected samples of all the shells in the strata, and submitted them to Mr. H. B. Preston for examination, and he agrees with me that they were not deposited with a raised beach, but were the refuse forming a "kitchen midden." I append Mr. Preston's report:—

"1.—A *Fissurella* bears traces of having been held over a fire, as the shell is cracked as though by the action of intense heat.

2.—Another specimen of *Fissurella* is so fresh internally as to give the impression that it has in no way been 'beach-rolled.'

3.—The *Purpura* has probably been split open, as though to obtain the animal whole.

4.—All are probably edible kinds, and easily obtainable within tide-marks."

These remarks I can corroborate, and supplement as follows:—

5.—All these species are now collected by the people for food from the rocks.

6.—They are all rock species, which when dead would quickly be smashed to pieces by the tremendous surf always running.

7.—There are no small *specimens* among them, the big ones being naturally selected for food.

8.—There are no small *species* among them, though an abundance of small species is found now on the rocks with the large ones, and would be mingled with the large ones if naturally deposited.

Mr. H. B. Preston, to whom I have submitted all the shells collected during the voyage, has kindly sent me the following notes.

LIST OF THE MOLLUSCA,
WITH DESCRIPTIONS OF SIX NEW SPECIES.

BY H. B. PRESTON, F.Z.S.

<i>Austrofusus alternatus</i> Phil.	-	Pisagua.
<i>Nassa tschudii</i> Troschel	-	Caleta Buena.
<i>N. flammulata</i> Preston	-	Caleta Buena.
<i>Astyris caletæ</i> Preston, sp. nov.	-	Caleta Buena.
<i>A. lioneli</i> Preston, sp. nov.	-	Caleta Buena.
<i>Concholepas peruviana</i> Lk.	-	Pisagua.
<i>Priene rudis</i> Brod.	-	Pisagua.
<i>Turritella</i> sp. ? (juv.).	-	Pisagua.
<i>Littorina peruviana</i> Lk.	-	Pisagua.
<i>L. brasiliensis</i> Guild.	-	Paranagua.

<i>Littoridina limosa</i> Preston, sp. nov.	-	Port Famine.
<i>L. lioneli</i> Preston, sp. nov.	-	Port Famine.
<i>L. faminensis</i> Preston, sp. nov.	-	Port Famine.
<i>L. angustiarum</i> Preston, sp. nov.	-	Port Famine.
<i>Prisogaster niger</i> Gray	-	Pisagua.
<i>Chlorostoma atrum</i> Lesson	-	Pisagua.
<i>Acmea ceciliana</i> d'Orbigny	-	Pisagua.
<i>A. viridula</i> Lk., var.	-	Pisagua.
<i>Chiton cumingii</i> Fremb.	-	Pisagua.
<i>Cyrena</i> sp. ? (dead valves only)	-	Rio Grande do Sul.

The Port Famine mud also contained a number of odd valves of various Pelecypods, but all in too poor condition to be of any use for purpose of identification.

The following are the descriptions of the new species :—

Astyris caletæ sp. nov.—

Shell somewhat radiiform, solid, reddish-chestnut flecked and transversely banded, especially on the last whorl below the periphery, with yellow; whorls seven, regularly increasing, the first six smooth, but for indistinct transverse growth lines, the last bearing a number of revolving liræ at the base; suture impressed, very narrowly margined with white below; columella slightly callously thickened, bearing about six weak plaits; labrum thickened, of a darker chestnut colour than the remainder of the shell, broadly and shallowly notched above, bearing five pinkish denticles on the inner margin; aperture subrectangular; canal short and somewhat broad.

Alt., 8·5 mm.; diam. maj., 4·5 mm.; diam. min., 3·75 mm.

Aperture: Alt., 4·25 mm.; diam., 1·75 mm.

Hab.: Caleta Buena, Chile (Lionel E. Adams).

Astyris lioneli sp. nov.—

Shell allied to *A. caletæ* Preston, but differing from that species in its much smaller size and narrower form, and in having one whorl less; it has but three weak plaits on the columella, and the labrum is quite destitute of denticulation within.

Alt., 6·5 mm.; diam. maj., 3·5 mm.; diam. min., 2·75 mm.

Aperture: Alt., 3·25 mm.; diam., 1·25 mm.

Hab.: Caleta Buena, Chile (Lionel E. Adams).

Littoridina limosa sp. nov.—

Shell small, subulate, with slightly obtuse apex, reddish-horn colour; whorls six, regularly increasing, flattened, smooth; suture

rather lightly impressed; columella margin nearly vertically descending, a little curved below, diffused above into a whitish, well-defined, parietal callus, which reaches the upper margin of the labrum; labrum acute, dilated at the base, somewhat bent inwards over the aperture above; aperture ovate.

Alt. 3 mm.; diam. maj., 1.25 mm.

Hab.: Port Famine, Straits of Magellan, from a muddy bottom (Lionel E. Adams).

Littoridina lioneli sp. nov.—

Shell subulately fusiform, whitish, covered with a greenish-yellow periostracum; whorls six, the last slightly convex, smooth; suture impressed; columella obliquely descending above, then rather sharply curved, and again obliquely descending in the opposite direction below; labrum acute, a little dilated at the base, and slightly bent inwards over the aperture above; aperture rather elongately ovate.

Alt., 4 mm.; diam. maj., 1.75 mm.

Hab.: Port Famine, Straits of Magellan, from a muddy bottom (Lionel E. Adams).

Littoridina faminensis sp. nov. —

Shell subulate, whitish, covered with a greenish periostracum; whorls six, regularly increasing, somewhat flattened, smooth; suture impressed; columella descending in a curve, extending above into a thickish, well-defined, parietal callus, which reaches to the upper margin of the labrum; labrum acute, dilated at the base and in front; aperture rather roundly ovate.

Alt., 3.75 mm.; diam. maj., 1.5 mm.

Hab.: Port Famine, Straits of Magellan, from a muddy bottom (Lionel E. Adams).

Littoridina angustiarum sp. nov.

Shell allied to *L. faminensis* Preston, but much broader and with more convex whorls; the periostracum is of a light reddish-brown colour, and the aperture is rather more oblique and longer than is the case in that species.

Alt., 4 mm.; diam. maj., 2 mm.

Hab.: Port Famine, Straits of Magellan, from a muddy bottom (Lionel E. Adams).



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VOL. 14.

OCTOBER, 1915.

No. 12.

A LIST OF THE RECENT SPECIES OF SPONDYLUS Linné,
with some Notes and Descriptions of Six New Forms.

(Concluded from p. 338).

BY HUGH C. FULTON.

(Read before the Society, February 6th, 1915).

45.—*S. fragum* Reeve. Conch. Icon., pl. 17, fig. 61.

Hab.: Philippine Islands.

46.—*S. affinis* Reeve. Conch. Icon., pl. 17, fig. 62.

Hab.: Philippine Islands.

The type specimen is lighter in colour than the figure in the Iconica.

47.—*S. tenebrosus* Reeve. Conch. Icon., pl. 9, fig. 33.

Hab.: Moreton Bay, Australia.

48.—*S. multisetosus* Reeve. Conch. Icon., pl. 3, fig. 11.

Hab.: Philippines (Cuming).

The shell figured by Küster in the 2nd edition of the Conch. Cab., pl. 10, fig. 3, is certainly not *multisetosus*, but I am unable to identify it.

49.—*S. multimuricatus* Reeve. Conch. Icon., pl. 4, fig. 15.

Hab.: Philippine Islands (Cuming). Singapore (Tomlin).

50.—*S. depressus* Fulton, n.sp.

Shell moderately thickened, very depressed, upper valve with numerous very slightly raised longitudinal ridges, which on the posterior side bear short spines; colour whitish with dark brown maculations above and a broad margin of purplish-brown at the ventral margin; ligamental area moderately produced; lower valve whitish and roughly scored where it has been attached to rocks; anterior and posterior margins with short close-set colour-lines, as seen in *S. ducalis*, etc.

Maximum dimensions: Height, 80 mm.; width, 71 mm.; depth or diameter, 21 mm.

Hab.: New Caledonia.

Three specimens have been examined by me; the largest, taken as type, is somewhat more worn than the two smaller specimens, one of which is lighter and the other darker in colour than the type.

Its compressed form and short spines separate it from *multisetosus*.

51.—*S. igneus* Fulton, n.sp.

Shell pectiniform, moderately solid, upper valve fiery-red with white umbones and some specks of white at a line of growth towards the middle; ornamented with about twenty-six longitudinal ridges, bearing rather short red spines; lower valve of a lighter red; ligamental area moderately produced; interior white with margins bordered with red.

Maximum dimensions: Height, 45 mm.; width, 42 mm.; diameter or depth, 23 mm.

Hab.?

A beautiful little shell of the *multimuricatus* group.

52.—*S. layardi* Reeve. Conch. Icon., pl. 18, fig. 66.

Hab.: Ceylon.

The type specimen is not so dark in colour as represented in the Iconica.

53.—*S. pesasininus* Bolten. Museum Boltenianum, 1798, p. 194. Conch. Cab., vii., pl. 46, figs. 472, 473.

(=*digitatus* Perry. Perry's Conch., 1811, pl. 59, no. 3).

(=*costatus* Lamk. Anim. Sans Vert., vi., p. 189).

(=*multilamellatus* Lamk. Anim. Sans Vert., vi., p. 189).

(=*petroselinum* Sowb. Thes. Conch., figs. 6, 10 & 49).

(=*foliaceus* Reeve. Conch. Icon., fig. 25).

Hab.: Philippine Islands (Cuming). Mauritius (Sow.).

Chenu in his Illust. Conchyl. figures quite a different species as *multilamellatus* Lamk., but the figures referred to by Lamarck are certainly *pesasininus* Bolt.

GROUP K.

54.—*S. tenellus* Reeve. Conch. Icon., pl. 18, fig. 67.

Hab.: Australia.

There are two specimens in the British Museum collection from Adelaide much larger than the type, with less numerous but longer spines. There are also short-spined specimens said to be from Tasmania.

55.—*S. rostratus* Chenu. Illust. Conchyl., p. 7, pl. 26, fig. 4.

Hab. : Indian Seas (Chenu).

Two specimens that I refer to this species are larger, and the ligamental area, or "talon," is not so produced as in Chenu's figure; in one the umbones are about 6 mm. apart, and in the other closer together. One specimen is coloured similarly to the type, the other has its upper valve almost covered with dark reddish-brown, the striae being whitish towards the ventral margin.

56.—*S. cruentus* Lischke. Mal. Blätt., xv., 1868, p. 221. Jap. Meer. Conchyl., i., p. 172, pl. 12, figs. 1-5.

Hab. : Nagasaki (Lischke).

57.—*S. lima* Chenu. Illust. Conchyl., p. 6, pl. 24, fig. 7.

Hab. ?

A distinct and very pretty species of which I have seen specimens from Kii, Japan, of a more orange colour.

GROUP L.

58.—*S. aurantiacus* Bolten. Museum Boltenianum, 1798, p. 195.

Conch. Cab., vii., t. 45, fig. 463. Conch. Icon., fig. 19.

(=*croceus* Lamk. Anim. Sans Vert., vi., p. 192).

Hab. : Indian Ocean; Moluccas (Reeve).

Chenu's figure in his Illust. Conchyl., pl. 27, fig. 1, may be this species, but the figure on pl. 24, fig. 6, is more like a compressed form of *pictorum*. I am doubtful whether the shell figured in Thes. Conch., fig. 31, is really *croceus*.

59.—*S. monachus* Chenu. Illust. Conchyl., p. 6, pl. 26, fig. 5.

Hab. : Indian Seas (Chenu).

Possibly a variety of *aurantiacus* Bolten.

60.—*S. butleri* Reeve. Conch. Icon., pl. 4, fig. 14.

Hab. : Philippine Islands (Cuming).

61.—*S. ustulatus* Reeve. Conch. Icon., pl. 16, fig. 58.

(=*vexillum* Reeve. Conch. Icon., pl. 16, fig. 59).

Hab. : Bermudas (Reeve).

The figures given in Thes. Conch., figs. 23, 25, and 56, and in the Conch. Icon., fig. 46, as representing *longitudinalis*, are varieties of *ustulatus*.

GROUP M.

- 62.—*S. americanus* Hermann, der Naturforscher, xvi., 1781, p. 51. Conch. Cab., vii., pl. 45, fig. 465. Illust. Conchyl., pls. 3, 4, and 5. Thes. Conch., figs. 42, 64, and 65. Conch. Icon., pl. 4, fig. 17. Conch. Cab. (2nd edit.), vol. vii., fig. 465.

(=*echinatus* Martyn. Univ. Conch., ii., 1784, fig. 154).

(=*americanus* Lk. Anim. Sans Vert. vol. vi., p. 188).

(=*arachnoides* Lk. Anim. Sans Vert., vol. vi., p. 188).

(=*longispina* Lk. Anim. Sans Vert., vol. vi., p. 189).

(=*avicularis* Lk. Anim. Sans Vert., vol. vi., p. 189).

Hab. : American seas (Chenu) ; Bermudas (Reeve) ; Porto Rico (Dall and Simpson).

An extremely variable species, both in colour and in the disposition of its spines, well illustrated by the fine series of figures given by Chenu in his Illustrations Conchyliologiques.

- 63.—*S. crassisquamatus* Lk. Anim. Sans Vert., vi., 1819, p. 191. Conch. Cab., vii., pl. 69, figs. E, F. Thes. Conch., fig. 28. Conch. Icon., figs. 24 and 29.

(=*princeps* Brod. P.Z.S., 1833, p. 4).

(=*dubius* Brod. P.Z.S., 1833, p. 4).

(=*leucacantha* Brod. P.Z.S., 1833, p. 5).

(=*pictorum* Sow. Thes. Conch., fig. 45).

(=*basilicus* Reeve. Conch. Icon., fig. 41).

Hab. : Island of Plata, West Columbia (Cuming).

This species is extremely variable in colour ; it occurs from pure white to red and purple-brown. The *leucacantha* Brod. has a colouration of orange and white, the orange generally covering the umbonal region and extending along the spines. It rarely occurs as figured by Reeve with its whole surface orange and white spines. Sowerby's figure of *pictorum* in Thes. Conch., pl. 85, fig. 17, is to me doubtful ; it seems almost too highly coloured for any species of *Spondylus*. Lamarck also referred to the fig. 1, tab. 28, Rumph. Mus., which may represent *crassisquamatus*, but it is difficult to say so with any certainty.

- 64.—*S. unicolor* Sow. Proc. Zool. Soc., 1847, p. 86. Thes. Conch., fig. 19. Conch. Icon., fig. 37.

Hab. ?

Owing to the difficulty of tracing the whereabouts of Sowerby's type, I am unable satisfactorily to identify this species with any specimens I have examined. Reeve's figure does not agree altogether with Sowerby's, which is coloured purple, but according to the descrip-

tion, should be uniform purplish-red, which accords better with the colour of Reeve's figure and agrees perfectly with the Cumington specimen.

65.—*S. powelli* Smith. *Journ. of Conch.*, 1892, vol. 7, p. 70.

Hab. : Madeira.

66.—*S. smithi* Fulton, n.n.

(=*radula* Reeve. *Conch. Icon.*, 1856, pl. 14, fig. 52,
not *radula* Lk. (fossil), *Ann. du Mus.*, 1806, vol. 8,
p. 351.

Hab. : Tehuantepec, West Mexico (Capt. Dare).

Named in honour of Mr. Edgar A. Smith, I.S.O.

67.—*S. limbatus* Sowerby. *Proc. Zool. Soc.*, 1847, p. 87. *Thes. Conch.*, fig. 51. *Conch. Icon.*, fig. 34.

Hab. : Persian Gulf (Sowerby).

Reeve's figure in the *Conch. Icon.* does not bear much likeness to Sowerby's figure in the *Thes. Conch.*, but the species of *Spondylus* vary so much that, without an examination of the types, one scarcely dares to consider them as being distinct species. There are three specimens in the National Collection similar to Reeve's figure, except that two of them are of regular growth, not distorted. I refer to the V-shaped sinus shown in figure. There is no record as to where Sowerby's type is now, but he refers to specimens in the British Museum.

68.—*S. calcifer* Carpenter. *Catalogue of Mazatlan Shells in British Museum*, 1857, p. 152.

Hab. : Bay of Panama (Cuming) ; Mazatlan (Carpenter).

This species is very close to *S. limbatus* as figured by Reeve, and may possibly prove to be the same species. The specimens of *calcifer* in the British Museum appear to be of a darker purple-red colour than *limbatus*, and shew more prominently the fine longitudinal striae between the principal ridges. Old shells are generally very worn and bored by various organisms; the young shells have long spatulate spines, and are variously coloured, red, purple, and yellow.

69.—*S. exilis* Sowerby. *Proc. Mal. Soc.*, 1895, vol. i., p. 280, figured.

Hab. : Karachi.

There are other specimens in the British Museum that I take to be the same species; they are from Jeddah, Red Sea.

70.—*S. gloriandus* Melv. and Stand. *Proc. Zool. Soc.* (1906), 1907, p. 811, pl. 53, fig. 1.

Hab. : Persian Gulf.

GROUP N.

- 71.—*S. varius* Sowerby. Appendix Cat. Polyn. Shells coll. by Stutchbury, 1829. Thes. Conch., figs. 21, 22. Conch. Icon., fig. 3.
 (= *delesserti* Chenu. Illust. Conchyl., pl. 12).
 (= *varians* Auct.).

Hab.: Polynesian Islands (Sowerby).

No reason was given by Sowerby for changing the name from *varius* to *varians*.

- 72.—*S. gravis* Fulton, n.sp.

Shell oval, of a heavy solid substance; umbonal area white, the rest of the exterior of a rather light purple-brown colour; both valves with numerous longitudinal rugose ridges, which are more prominent on the right or lower valve; there are also numerous fine striæ between the ridges, these with the concentric lines of former margins give the shell, especially the less-worn undervalue, a rough wavy appearance; judging by the way in which light shews through the undervalue, it is not absolutely solid, but probably of the same laminar construction as in the so-called water-*Spondylus*, *S. varius* Sowb. Interior margin crenulated and edged with same colour as exterior; ligamental area greatly produced, somewhat twisted, and forming a triangle, the sides of which are about 55 mm. in length.

Maximum dimensions: Height (umbo of lower valve to ventral margin), 144 mm.; width (anterior to posterior margin), 102 mm.; depth or diameter, 67 mm.

Hab. ?

- 73.—*S. rubicundus* Reeve. Conch. Icon., pl. 17, fig. 60.

Hab.: Philippine Islands.

GROUP O.

- 74.—*S. candidus* Lamk. Anim. Sans Vert., vi., 1819, p. 188. Illust. Conchyl., pl. 12, fig. 4. Thes. Conch., figs. 3-5. Conch. Icon., fig. 22. Conch. Cab. (2nd edit.), pl. 10, fig. 4.

Hab.: Australia (Chenu); Lord Hood's Island (Cuming).

Besides white specimens, there are others varying from rose colour to orange.

- 75.—*S. iredalei* Fulton, n.sp.

Shell solid, exterior of a coral-red colour, except the earliest portion which is whitish, more so on the under than the upper valve; there are about nine principal longitudinal ridges on the

upper valve, bearing short stunted spines, between these ridges are seven to ten finer ridges having somewhat the appearance of granose striæ, but seen under the lens to consist of minute and more or less fluted spines or costæ; ligamental area produced, leaving the umbones about 13 mm. apart; margin of interior narrowly bordered with orange-red.

Maximum dimensions : Height, 66 mm. ; width, 47 mm. ; diameter or depth, 35 mm.

Hab. : Kermadec Islands (T. Iredale).

Besides the type, which is in good condition, Mr. Iredale collected a number of odd valves (more or less worn) the largest of which measures 68 × 64 mm. ; he also obtained a young and perfect example which has some longer spines; probably older specimens living under more favourable conditions than the type would have comparatively longer spines. Although the specimens vary in form, they are all constant in colour, and in possessing the characteristic sculpture.

Named in honour of Mr. T. Iredale, to whom we are indebted for many valuable papers on the mollusca.

76.—*S. excavatus* Chenu. Illust. Conchyl., p. 5, pl. 19, fig. 2.

Hab. : Cape de Verde Islands.

77.—*S. occidentis* Sowerby. *Journ. of Mal.*, 1903, vol. 10, p. 77, figd.

Hab. : Philippines.

78.—*S. flabellum* Reeve. Conch. Icon., pl. 6, fig. 21; and pl. 13, fig. 21B.

Hab. ?

79.—*S. pacificus* Reeve. Conch. Icon., pl. 1, fig. 1. Conch. Cab. (2nd edit.), pl. 10, fig. 5.

Hab. : Lord Hood's Island, Pacific (Cuming).

80.—*S. anacanthus* Mawe. Linn. Syst. Conch., 1823, pl. 2, fig. 3. Conch. Cab., vol. xi., pl. 203, figs. 1989, 1990. Thes. Conch., figs. 39, 40. Conch. Icon., fig. 2.

(=*nudus* Reeve. Conch. System., 1841).

Hab. : West Indies (Chenu); Mauritius and Philippines (Cuming); Japan (Dunker).

81.—*S. obliquus* Chenu. Illust. Conchyl., p. 7, pl. 24, fig. 5.

Hab. ?

Sowerby, in the Thes. Conch., i., p. 426, suggests that this may be a young *varius* Sow. (= *varians* Auct.), but I fail to see any likeness to the young of that species.

- 82.—*S. gussoni* Costa. Cat. Sist. Test. Sicil., 1829, p. 41. Phil., Enum. Moll. Sicil., 1836, pl. v.; fig. 16. Conch. Icon., fig. 5. Conch. Cab. (2nd edit.), pl. 4, figs. 3, 4.

(=*minus* Chenu. Illust. Conchyl., pl. 26, fig. 5).

(=*albidus* Brod. Proc. Zool. Soc., 1836, p. 43).

(=*albus* Sowerby. Thes. Conch., fig. 54).

Hab.: Mediterranean.

- 83.—*S. ostreoides* Smith. Voyage 'Challenger' Lamellibranchiata, p. 326, figured.

Hab.: Kermadec Islands ('Challenger').

POSITION DOUBTFUL.

- 84.—*S. concavus* Desh. Cat. des Moll. de l'Ile de la Réunion, 1863, p. 34, pl. 5, figs. 1, 2.

Hab.: Réunion Island.

Described from two lower or right valves only.

- 85.—*S. fauroti* Jousseaume. Mem. Soc. Zool. Fr., 1888, i., p. 221.

Hab.: Red Sea.

Described from two odd valves; no figure is given or any comparison made with other species.

- 86.—*S. longitudinalis* Lamk. Anim. Sans Vert., vi., 1819, p. 191.

It is doubtful whether this species can be identified; the type specimen was in the Dufresne Collection, which has probably been distributed and the types lost sight of. Lamarck referred with doubt to the figures in Chemnitz, Conch. Cab., vii., pl. 45, figs. 466, 467, which probably represent *S. gæderopus*.

The figure given by Chenu, Illust. Conch., pl. 9, fig. 1, is quite different from those figured by Sowerby, Thes. Conch., figs. 23, 25, and 56, and Reeve, Conch. Icon., fig. 46, all of which are to me varieties of *ustulatus* Reeve. I have received a photograph of the shell figured by Chenu, which is now in the Geneva Museum; the authorities there cannot say with any certainty that it is the actual type specimen.

- 87.—*S. plicatus* Linné. Systema Naturæ, 1767, p. 1136, no. 153 (not *S. plicatus* Munster, apud Goldfuss Petr. (fossil) pl. 106, figs. 7A, B, 1826-1864).

Hab.: Java.

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ANNUAL MEETING.—NOTICE TO MEMBERS.

THE ANNUAL MEETING will be held at the Manchester Museum, on *Saturday, October 16*, and members who intend to exhibit are requested to furnish particulars and amount of space required to Mr. R. Standen, Manchester Museum, without delay.

It is absolutely necessary that those who wish to be present at the Tea should send word beforehand to Mr. Jackson at the Museum.

The inconvenience caused by those who neglect this elementary courtesy is very considerable.



Tentacular Abnormality in *Helix nemoralis*.—On April 25th of this year I found at Brook, near Ashford, in Kent, a specimen of *Helix nemoralis* with curiously deformed tentacles. The upper pair are conjunct for half their length, thus forming a fork, like the letter Y. The lower tentacles are even more abnormal. For where the right tentacle would normally be, there is a kind of irregular reproduction of the upper fork, the right prong being much bigger than the left one; both these prongs possess the characteristics of tentacles. On the other hand,



where the left tentacle would normally be, there is a small protuberance, which only resembles a tentacle in that it is somewhat retractile. This is the only feature not shown in the drawing, which is $\times 3$. In all other respects the snail is apparently quite a normal five-banded example. Mr. J. W. Taylor informs me that he has not observed this abnormality in *H. nemoralis* before; so I think it should be recorded.—A. J. ARKELL. (*Read before the Society, June 9th, 1915*).



A New Variety of *Columbella misera* Sow. from Japan.—I have recently received from Mr. Hirase, of Kyoto, specimens of a very pretty form, which I assign to this species, and which seems to deserve a varietal name. I therefore propose to call it *Columbella misera* var. *nigromaculata* nov. The shell is almost or quite pure white, with a single peripheral band of interrupted black spots—one spot on each of the longitudinal ribs. The band occurs on each of the last three or four whorls, and the spots vary somewhat in size and intensity in different specimens. I have one example in which they have coalesced to form a fairly broad, continuous band. The variety comes from Oshima, Osumi.—J. R. LE B. TOMLIN (*Read before the Society, June 9th, 1915*).

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN & IRELAND.

441st Meeting, held at the Museum, Manchester, April 14, 1915.

Mr. E. Collier in the chair.

Donations to the Cabinet announced and thanks voted:—

By Dr. A. E. Boycott:—The collection of *Clausilia bidentata* from one square yard of wall at Portmadoc, showing range of variation and frequency of the different sizes.

Donations to the Library announced and thanks voted:—

"The Marine Mollusca of São Thomé, I.," by J. R. le B. Tomlin and L. J. Shackleford.

"Two New Species of *Marginella* from South Africa," by L. J. Shackleford.

"Land and Freshwater Mollusca of India, part xii. (text and plates)," by Lieut.-Col. H. H. Godwin-Austen—(from the respective authors).

"Étude sur le Genre '*Pomatias*' Studer," by M. Caziot.

"Faune du Tumulus de St. Christophe," by M. Caziot.

"Zur Naturgeschichte der *Campylaea phalerata* Zgl.," by P. Ehrmann—(presented by Mr. J. W. Taylor).

"Histoire Naturelle des Mollusques Terrestres et Fluviales de la France," by J. P. R. Draparnaud.

"Complément de l'Histoire Naturelle des Mollusques Terrestres et Fluviales de la France, de J. P. R. Draparnaud," by A. L. G. Michaud.

"Report of the Museum Committee [Manchester Museum] for the Year 1913-14,"—(presented by the Manchester Museum); and the usual periodicals received in exchange.

Donations to the Autograph Collection.

Autograph Letters of Dr. R. Bergh (presented by J. R. le B. Tomlin); J. Ponsby (by E. Collier); and Prof. A. E. Boycott (by the Hon. Secretary).

Resignation.

Mrs. A. Fordred.

Papers Read.

"Obituary Notice: William Cash," by W. Denison Roebuck, F.L.S.

"Description of a New Variety of *Cypraea variolaria* Lamk.," by J. Cosmo Melvill, D.Sc., and R. Standen.

Exhibits.

By Mr. J. Wilfrid Jackson: *Sphaerium pallidum* and *Physa heterostropha* from the Bolton Canal at Pendleton; *Physa heterostropha* from the Stockport Canal at Reddish; *Paludetrina jenkinsi* (a non-carinate form) and *P. taylori* from the Ashton Canal at Fairfield Locks near Droylsden; *Paludetrina jenkinsi* (carinate, non-carinate, and semi-carinate forms; also fry) from the Peak Forest Canal at Marple; *Pisidium supinum* and *P. henricianum* from a pond at Birch, Manchester (coll. R. Standen, 1887).

By Mr. G. C. Spence: *Coelocentrum gigas* Pfr., with eggs and embryonic shell, and a number of species of *Megalomastoma*, *Cataulus*, etc.

By Mr. R. Standen: Typical forms of *Cypraea variolaria* Lam., *C. erosa* L., and *C. helvola* L., with pellucid varieties of the same, to illustrate his and Mr. J. C. Melvill's paper.

In the Special Exhibit of *Cyclope*—or, more properly, *Neritula*—a good series of the known species was shown, and their characteristics commented upon by Mr. J. R. Hardy and Mr. R. Standen.

442nd Meeting, held at the Museum, Manchester, May 12, 1915.

Mr. R. Standen in the chair.

Additions to the Library announced and thanks voted :—

"On *Helix (Macularia) ogdeni* n.sp., from the Pliocene (Red Crag) of Rams-holt, Suffolk," by A. S. Kennard and B. B. Woodward.

"Descriptions of Colour Varieties of *Conus quercinus* Hwass, and *Cypræa lamarekii* Gray, by H. O. N. Shaw.

"An Index to the Museum Boltenianum," by W. H. Dall (*from the respective authors*); and the usual periodicals received in exchange.

Donations to the Autograph Letter Collection announced and thanks voted :

Kobelt, Dunker, Heynemann, and W. H. Dall, by J. R. le Brockton Tomlin; E. L. Layard, by Dr. H. Becker; C. F. Ancey and J. Ponsonby, by L. J. Shackleford.

Candidate Proposed for Membership.

Miss Bertha M. Challis, State Museum, University of Washington, Seattle, Washington, U.S.A. (introduced by R. Standen and L. J. Shackleford).

Resignations.

Miss H. T. Gnosselius.

W. G. Poole.

TREASURER'S REPORT.

Statement of Accounts for the Year 1913.

RECEIPTS.			EXPENDITURE.		
	£	s. d.		£	s. d.
Cash in hand...	16	2 6	Cost of <i>Journal</i> for Jan. ..	13	9 1½
Subscriptions	84	11 0	" " April ..	13	0 5½
Three Life Composition Fees	9	9 0	" " July ...	12	9 6
Advertisements	2	13 0	" " Oct. ...	12	18 5
Sale of Publications	9	2 8	Reprints	5	3 6
			Stationery	3	9 5
			Malacological Society—Sub-		
			scription and Entrance Fee.	1	1 0
			Six Parts Malacological Journal	1	16 0
			Recorder's Expenses...	2	7 8
			Editor's Expenses	0	11 0
			Secretary's Expenses	7	11 8
			Treasurer's Expenses	1	8 6
			Balance in hand	46	11 11
	£121	18 2		£121	18 2

Statement of Accounts for the Year 1914.

RECEIPTS.				EXPENDITURE.			
	£	s.	d.		£	s.	d.
Cash in hand ...	46	11	11	Cost of <i>Journal</i> for Jan. ...	13	4	0
Subscriptions ...	36	6	0	„ „ April ...	12	16	11
Sale of Publications ...	11	12	2	„ „ July ...	13	11	2
				„ „ Oct. ...	13	15	8
				Cost of Illustrations ...	2	4	0
				„ Reprints ...	4	1	9
				„ Stationery ...	1	19	5
				Malacological Society ...	0	10	6
				Secretary's Expenses ...	5	14	4
				Cash in hand... ..	26	12	4
	£94	10	1		£94	10	1

Exhibits.

By Mr. R. Standen : Specimens of *Ranella gigantea* Lam., and *Cassidaria rugosa* L. (ex coll. G. M. Morris), dredged alive recently off the south-west coast of Ireland, in deep water, by Captain Applegate. Five examples of the *Ranella* and ten of the *Cassidaria* were obtained in good condition. Locality series of *Cassidaria rugosa* and *C. echinophora* from Arcachon and Cadiz were shown for comparison, and it was pointed out that the Irish *C. rugosa* were larger and much more delicate in texture than Mediterranean specimens, have no trace of nodules on the whorls, and all agree exactly with the form figured as *C. tyrrhena* of Chemnitz.

Specimens of fossil *Cassidaria* from the Coralline Crag were shown by Mr. J. Wilfrid Jackson for comparison with the recent forms.

By Mr. J. Wilfrid Jackson : *Sphaerium rivicola* from the canals at Droylsden and Bardsley ; *Planorbis cornuus* from the canal near Daisy Nook, and from a pond south of Droylsden Station ; *Limnæa pereger*, monstrosity, and *Pisidium amnicum* wedged in hole in clinker, from the canal at Droylsden ; *Physa fontinalis* and large *P. heterostrophæ* (one specimen measuring 17.7×11.8 mm.) from the Bolton Canal at Agecroft ; *Paludetrina jenkinsi* from the same canal at Clifton Junction ; *Limnæa pereger* var. *ovata* from a pond at Droylsden ; and a set of a remarkably large form of *L. pereger* var. *inflata*, including a subscalariform example, from the canal at Bardsley. The following are the dimensions of some of the specimens : 30×23.7 ; 31.4×22.5 ; 29×22.5 mm.

Mr. Jackson also reported the finding of *Arion subfuscus* var. *succinea* at Agecroft (specimens confirmed by Mr. W. D. Roebuck).

By Mrs. Gill : A series of opercula of various marine and terrestrial mollusca.

In the Special Exhibit of the Genus *Papuina* an extensive and representative series was shown, chiefly by Mrs. Gill, who gave a résumé of the known habits and geographical distribution of this beautiful group of land shells.

443rd Meeting, held at the Museum, Manchester, June 9th, 1915.

Mr. E. Collier in the chair.

Additions to the Library announced and thanks voted :

"The Marine Mollusca of São Thomé, II.," by J. R. le B. Tomlin and L. J. Shackleford.

"Rediscovery of Pourtales' *Haliotis*," by J. B. Henderson (*from the respective authors*).

"Catalogue of the Mollusca of the counties of Aberdeen, Banff and Moray, and the neighbouring seas," by Robert Dawson. "Supplement to Dawson's 'Mollusca of Aberdeen and the neighbouring seas,'" by James Simpson (presented by J. Simpson); and the usual periodicals received in exchange.

Donation to the Autograph Letter Collection :

Henry Suter by L. J. Shackleford.

New Member Elected.

Miss Bertha M. Challis.

Candidates Proposed for Membership.

T. van Hyning, Museum Curator, Florida State Museum, Gainesville, Fla., U.S.A. (introduced by J. R. le B. Tomlin and L. J. Shackleford).

C. P. Hurst, The Corner House, Great Bedwyn, Hungerford (introduced by R. Standen and L. J. Shackleford).

Member Deceased.

Miss Lucinda Milner.

Papers Read.

"Mollusca and Brachiopoda of the Irish Atlantic slope between 50 and 1,000 fathoms," by Anne L. Massy.

"Notes on Wiltshire Mollusca," by C. P. Hurst.

"Tentacular abnormality in *Helix nemoralis*," by A. J. Arkell.

"A new variety of *Columbella misera* Sow. from Japan," by J. R. le B. Tomlin, M.A.

"Description of a new *Rissoina*," by J. R. le B. Tomlin, M.A.

Exhibits.

By Mr. E. Collier: A fine example of *Atopocochlis exarata* (Müller), from S. Thomé.

By Mr. G. C. Spence: *Urocoptis (Arangia) scobinata* Torre and Ramsden, a beautiful new species recently described from La Paz, East Cuba.

In the Special Exhibit of the genus *Marginella* Mr. J. Wilfrid Jackson showed a number of fossil species, and there was a fine display of about 300 of the recent species, shown by Messrs. J. Kidson Taylor, C. H. Moore, Mrs. Gill, and Rev. Lewis Shackleford.



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— — — Longford ...	81	Westmorland with Lake Lanes, New Records ...	82, 92
— — — Renfrew ...	163	Wexford, New Records ...	82
— — — Worcester ...	311	Wight, Isle of, New Records ...	312
— <i>piscinalis</i> new to Dumfries ...	311	Wigtown, see Clyde Islands.	
— — — Ebudes Mid ...	311	Wiltshire North, <i>Helix pomatia</i> ...	82
— — — Lanark ...	163	— South, New Records ...	312
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		York Mid-West, <i>Vallonia excentrica</i> ...	224
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		York North-West, <i>Helicella virgata</i> ...	224
		<i>Zonitoides nitidus</i> new to Cardigan ...	223
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		— — — Merioneth ...	81
		— — — Westmeath ...	82
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		— <i>excavatus</i> new to Wigtown ...	346

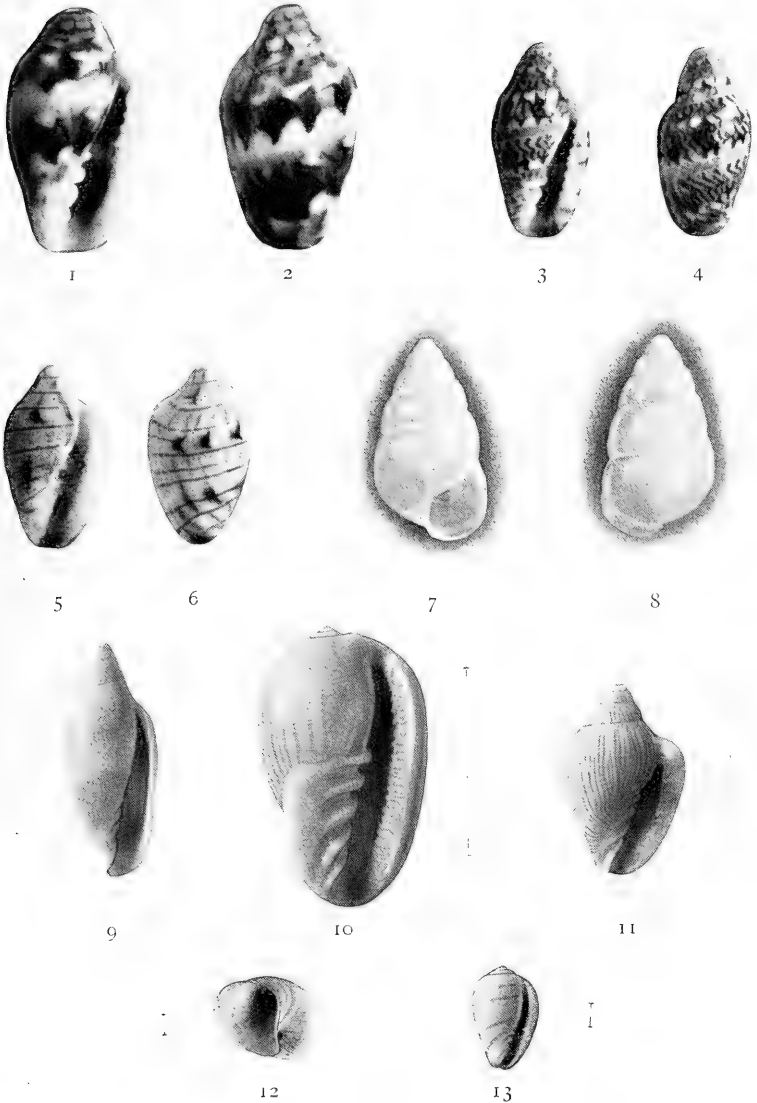
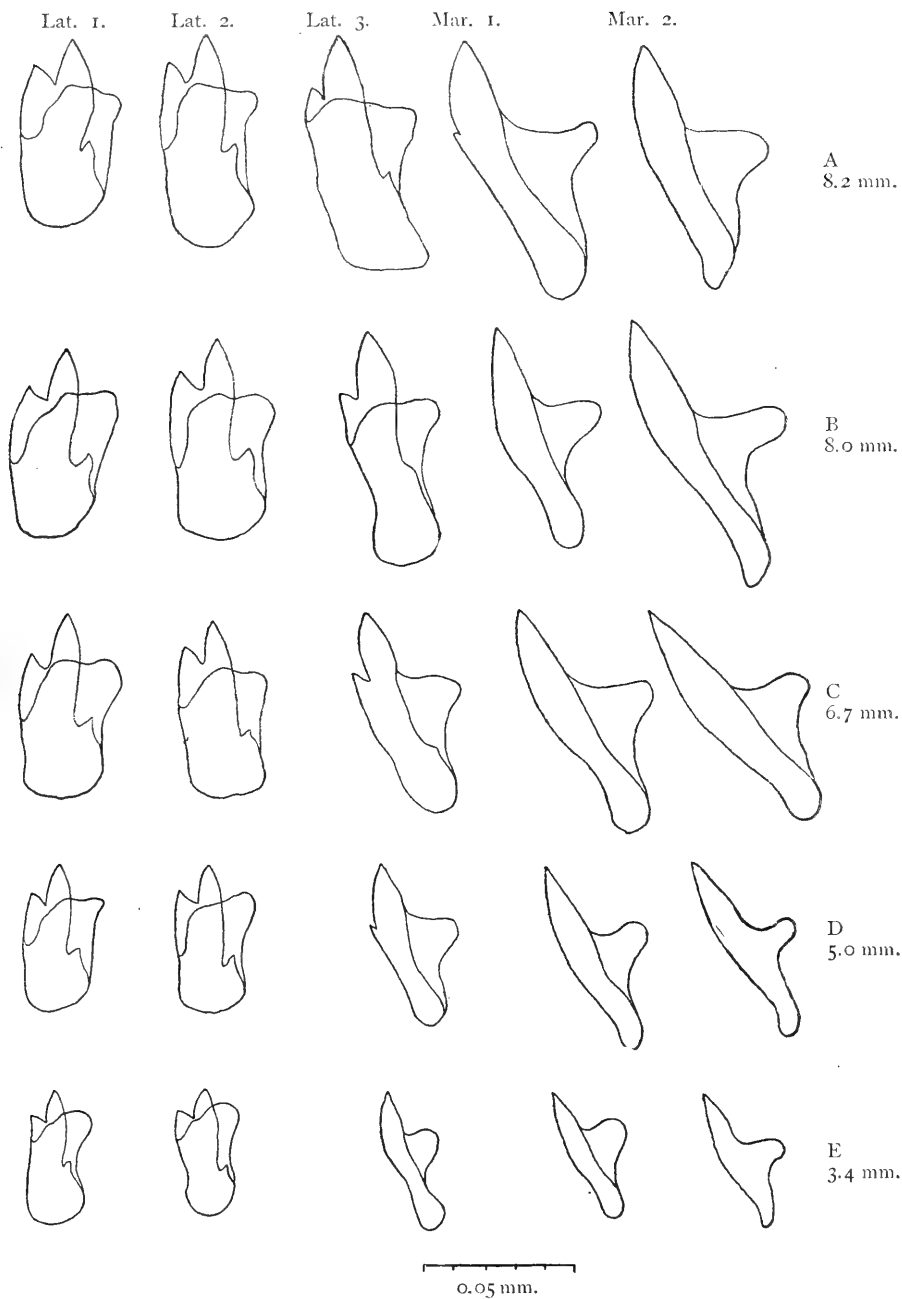
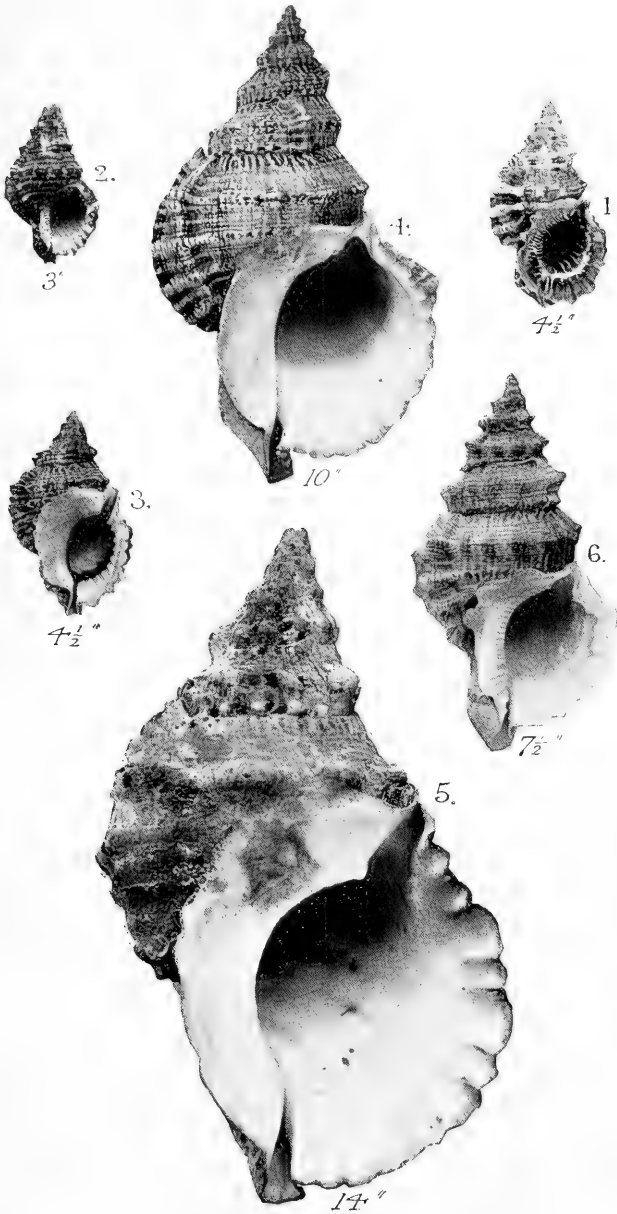


FIG. 1, 2. *Marginella melvilli* Tomlin & Shackleford (see p. 11).
 „ 3, 4. *M. festiva* Kiener (see p. 43).
 „ 5, 6. *M. eveleighi* Tomlin & Shackleford (see p. 11).
 „ 7, 8. *Mucronalia leucophaea* Tomlin & Shackleford (see p. 43).
 „ 9. *Marginella warrenii* Marrat (see p. 44).
 „ 10. *M. precallosa* Higgins (see p. 44).
 „ 11. *M. davisiana* Marrat (see p. 45).
 „ 12. *Adeorbis platymma* Tomlin (see p. 42).
 „ 13. *Marginella nana* Marrat (see p. 45).



Prof. Dr.
H. Mos

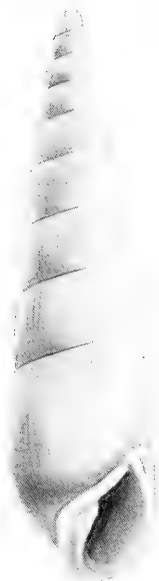




Bursa (Tutufa) rubeta (Bolten) and Varieties.



1



2



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4



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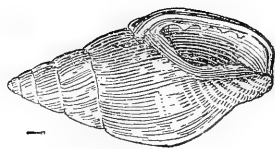


6

1. *Turbonilla phrikalea* Wats. (see p. 309).
2. *Syrnola thomensis* sp. nov. (see p. 308).
3. *Turbonilla pyrgidium* sp. nov. (see p. 309).

4. *Odostomia pithus* sp. nov. (see p. 308).
5. *Tropidorissoia taphrodes* sp. nov. (see p. 307).
6. *Leiostraca diauges* sp. nov. (see p. 308).

PLATE VI.



1



2



3



5



6



4

1. *Astyris caltae* Preston, n.sp.
2. *Littoridina limosa* Preston, n.sp.
3. *Astyris lioneli* Preston, n.sp.
4. *Littoridina angustiarum* Preston, n.sp.
5. *Littoridina famensis* Preston, n.sp.
6. *Littoridina lioneli* Preston, n.sp.



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